



SIERRA LEONE.

Annual Report

OF THE

Department of Agriculture
For the Year 1937.



1938

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DEPARTMENT OF AGRICULTURE.

REPORT FOR 1937.

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I have the honour to submit my report for the year ending December, 1937.

SECTION I—GENERAL REVIEW OF CROPS INCLUDING EXPORTS.

The past year has been a normal one for upland farmers. In some places early rains interfered a little with the burning of farms, but taking the country as a whole, very little difficulty was experienced in making farms for the 1937 crop. Owing to the fact that the 1936 crop was, as explained in my last report, somewhat short, farming operations started rather earlier than usual especially in damp situations which were specially suitable for cultivating early crops of rice. It is estimated that the area of upland farms was slightly above normal during 1937. With regard to wetland farms, the area still continues to increase year by year and it is thought that in the Scarcies area there was an appreciable increase in the amount of land cultivated as compared with 1936.

2. *Rice*.—Rice is the predominating crop in Sierra Leone. It is the main article of food and all farming is aimed at securing as large a supply of rice as possible. Farming is considered successful or otherwise by the amount of rice produced and farming must normally be viewed from this angle. While the early rains allowed of a normal amount of land to be cleaned and burnt for farming, the wet season lasted somewhat longer than normal and the harvesting of the crop was delayed a little in consequence. The crop, however, appears to be quite up to the average and there is apparently no reason to expect a shortage unless the market for rice in the mining area increases beyond that anticipated. The price of rice in 1937 was high on account of the bad crop in 1936 (due to bad climatic conditions that year) and steps had to be taken by Government to control the price of rice during the months of May to October. Government action took the form of appointing a Food Controller (the Director of Agriculture), establishing a control price for rice in Freetown and in various up-country centres, taking off the import duty on rice, and reducing the freight of rice from Freetown to inland centres. This action proved successful in keeping prices down to a reasonable level and allowed of the importation of rice to supply the deficiency and leave a small margin of profit for importers. 1937 was the first year since 1931 in which imports exceeded exports and this was due mainly to the bad season, but partly to the demands of the mining market, a market which has only recently grown up with the recent rapid expansion of the mining industry. Actually 4,204 tons of rice were imported (466 tons to Bonthe) and this is just about enough to fill the demands of that proportion of population supported by the mining industry.

3. In January, 1937 a meeting of traders interested in rice was held to consider the rice situation and what steps should be taken to prevent profiteering. The meeting were of the opinion that the 1936/37 rice crop was short and recommended the action recorded in the previous paragraph. The meeting also advised Government with regard to the price of rice which they regarded as the maximum which should be charged for rice in Freetown during the year. This maximum (11s. a bushel) was imposed over the whole of Sierra Leone and at first it worked satisfactorily since supplies were still coming from up-country to Freetown, but when these supplies fell off, and Freetown and certain centres up-country became more dependent on imported rice, it was found that while the control of price at Freetown was satisfactory, an amount, equivalent to the transport from Freetown to the station concerned, had to be added to the control price in up-country stations. The control prices for imported rice at up-country stations were therefore altered accordingly and the control worked reasonably well. Some little difficulty was experienced in getting control prices altered quickly in various districts, since Provincial, District and Law Officers had to be consulted as well as the Trading Community, but apart from this there was little difficulty in controlling the price of rice under the Food Control Ordinance.

4. The following table shows the movement of rice to and from Freetown from all sources as far as it could be ascertained. In this connection there was no difficulty in obtaining exact figures for consignment by rail or imports from abroad, but some difficulty was experienced in obtaining figures of rice transported (from the interior)

to Freetown by water. The latter were collected by Customs Officers at Sawpit wharf where all incoming boats should report, but many boats evaded reporting and it is thought that these figures are lower than the quantities actually received.

MOVEMENT OF RICE IN AND OUT OF FREETOWN FROM ALL SOURCES.
TONS*

	Into Freetown.				Out of Freetown.			
	Imports from abroad.	From Interior by Water.	From Interior by Rail.	Total.	By Water.	By Rail.	Total.	Left in Freetown for consumption.
January ...	4	251	47	302	28	—	28	274
February ...	4	310	30	344	10	—	10	334
March ...	4	185	27	216	21	—	21	195
April ...	4	199	27	230	11	—	11	219
May ...	66	92	12	170	25	37	62	108
June ...	454	92	8	554	16	191	207	347
July ...	772	29	4	805	17	347	364	441
August ...	1,801	—	6	1,807	1	607	608	1,199
September ...	573	22	133	728	—	245	245	483
October ...	—	11	490	501	—	28	28	473
November...	55	120	295	470	—	12	12	458
December ...	1	181	72	254	23	28	51	203
Total ...	3,738	1,492	1,151	6,381	152	1,495	1,648	4,734

5. It will be seen that rice was imported right up till September but the efforts of native farmers up-country to produce early rice was responsible for rice being harvested and coming into Freetown by rail in quantity by October. Importers of foreign rice were therefore caught with a certain amount of imported rice still on hand and the price of rice fell rapidly reaching a low level of 5s. a bushel† (retail) for native rice in Freetown during November. The retail prices of native rice throughout the year in Freetown were as follows :—

January ...	...	...	8s. to 9s. 6d. a bushel
February ...	...	...	8s. to 9s. 6d. "
March ...	...	...	10s. "
April ...	...	...	10s. 6d. to 11s. "
May ...	...	...	11s. "
June ...	...	...	11s. "
July ...	...	...	11s. "
August ...	...	...	11s. "
September ...	...	...	11s. falling to 9s. "
October ...	...	...	9s. falling to 8s. "
November ...	...	...	5s. to 6s. "
December ...	...	...	5s. 6d. to 7s. "

*Wherever the word "tons" is used in this Report it means "Long tons."

†Bushel—84 lb. by weight of clean rice.

6. There was an effort made in November by certain traders to reduce the price at which the 1937 crop was bought from native producers by selling rice on the Freetown market at a low rate of 5s. retail and 4s. wholesale, and it appeared at first that this might be successful. One firm however, tried to buy in large quantities for export, with the result that the price recovered rapidly in December and went up to 7s. a bushel by the end of the month, a price above normal for that time of the year.

7. Rice production in Sierra Leone is very nearly approximate to the needs of the inhabitants while the standard of nutrition remains on its present scale, a scale however, which is thought to be too low. In some years there is a small surplus and on others a small deficit and traders in rice speculate very heavily on the chances of rises in prices. It will be seen that where the market is small and overseas supplies generally negligible, a set of traders who can hold up a reasonable proportion of the rice available for the Freetown and mining markets can create a temporary scarcity in the market and are able to command a higher price for their rice. This buying and holding up of rice has often been successful in the past with certain traders, especially Syrians, who gamble largely on the rice market.

8. It is unfortunate that this gambling generally brings little profit to the producer and only high prices to the consumer and since neither producer nor consumer benefits by it, it is thoroughly undesirable. At the meeting of Rice Traders held in January to discuss the possibilities of the 1937 crop, it was unanimously agreed that the only way to prevent gambling in rice was for Government to control the price of rice. The imports and exports of rice since 1930 are given below :—

		Imports, White Rice, Tons.	Exports, Native Rice, Tons.	Excess (+) or Deficit (-) of Exports over Imports, Tons.
Average	1920-29 ...	986	96	— 890
	1930 ...	2,618	175	—2,443
	1931 ...	457	177	— 280
	1932 ...	301	559	+ 258
	1933 ...	125	158	+ 33
	1934 ...	81	221	+ 140
	1935 ...	29	1,024	+ 995
	1936 ...	45	204	+ 159
	1937 ...	4,204	8	—4,196

9. The above figures would appear to show that 1937 was the worst year for rice on record whereas actually it is the 1936 crop which feeds the country during 1937, and 1936 was the bad year. The farmers themselves (ninety per cent. of the population) had a reasonable supply of rice and it was mainly the wage earners in the mining areas (a class only recently come into existence) and in Freetown who were responsible for the imports. 1937 showed that even in a bad year the farmers now produce enough to carry on without serious privation and this is a great advance on the condition which prevailed fifteen years ago before the spread of swamp rice cultivation.

10. The normal demands of the Freetown market are estimated at 5,000/6,000 tons a year and the present requirements of the mining areas at 4,000/5,000 tons a year. The former is likely to remain fairly stationary unless there is a marked increase in prosperity when more rice will undoubtedly be eaten, while the latter is likely to increase with the development of the mining industry.

11. *Palm Kernels*.—There was a fall in the quantity of palm kernels exported in 1937 due to the fall in prices, especially in the latter half of the year. 76,776 tons valued at £884,812 were exported and this is 7,802 tons less than in 1936.

The total exports are given below :—

		Tons exported.	£
Average 1920-29 ...	...	58,150	1,024,798
1930 ...	...	56,641	664,591
1931 ...	...	54,462	449,742
1932 ...	...	77,162	687,477
1933 ...	...	64,084	472,824
1934 ...	...	68,655	470,780
1935 ...	...	78,019	583,645
1936 ...	...	84,578	810,238
1937 ...	...	76,776	884,812

12. The following figures show from which area the kernels were exported :—

	Export from Southern River Area through Bonthe and Sulima.	Export from "Line" Area through Freetown (Railments).	Export of Water-borne Kernels chiefly from Northern Rivers through Freetown.
	Tons.	Tons.	Tons.
1930 ...	19,624	27,666	9,351
1931 ...	15,356	32,992	6,114
1932 ...	23,993	41,933	11,044
1933 ...	19,931	33,294	10,859
1934 ...	22,114	33,925	12,614
1935 ...	23,545	43,106	11,368
1936 ...	27,217	44,416	12,965
1937 ...	23,693	39,424	13,659

13. The price of kernels varied considerably. In January the price opened at £13 5s. 0d. a ton in Freetown and went up to £14 10s. 0d. by the middle of the month, which proved to be the highest price of the year. From that time there was a steady fall in price throughout the year and December closed with the price at £6 12s. 6d. The prices in up-country stations are lower than the Freetown prices to allow for transport, etc. It will therefore be seen that in the richer palm areas up-country, e.g. Bo to Pendembu the price for kernels had reached a very low level during the later half of the year. In that area the price was about £5 0s. 0d. a ton during September to December.

14. *Palm-Oil*.—The exports of palm-oil have increased when compared with those of 1936 but are still only at the average level of the last twenty years. The prices on the average showed an improvement over previous years, especially in the early part of the year. By the end of the year however, prices were again on the down grade. The exports for 1937 and previous years are shown below :—

				Tons exported.	£
Average	1920-29	...	...	2,562	81,742
	1930	...	...	3,652	79,310
	1931	...	...	1,359	19,830
	1932	...	...	2,208	26,914
	1933	...	...	1,619	16,637
	1934	...	...	2,225	18,032
	1935	...	...	2,892	35,814
	1936	...	...	1,222	16,303
	1937	...	...	2,325	42,238

15. *Kola*.—The amount of kola exported in 1937 again showed a small increase and was the highest since 1929. Moreover, the price showed a very welcome improvement to the extent of nearly fifty per cent. when compared with 1936. The price is still very low when compared with the period before 1931 and it is unlikely that those prices will ever again be reached. Nigeria is increasing her production of kola and as that increases our export market decreases. The Sierra Leone farmer must therefore look for some other product to replace the money which he once made by the sale of kola.

				Tons exported.	£
Average	1920-29	...	...	2,932	279,678
	1930	...	...	2,271	186,197
	1931	...	...	1,584	47,847
	1932	...	...	2,085	41,373
	1933	...	...	1,812	43,656
	1934	...	...	1,460	18,304
	1935	...	...	1,859	39,415
	1936	...	...	2,301	41,539
	1937	...	...	2,382	60,504

16. *Ginger*.—There was a marked increase in the amount of ginger exported in 1937 and this was the highest for many years. The reason for this was a very welcome increase in the price which opened at 3½d. a lb. in January and rose to 4¾d. a lb. in April; afterwards declining to 3½d. and remaining at that figure till August, when it fell to 3d. a lb. Eventually the price fell to 2d. at the end of the year, but as over 2,000 tons had been exported by the end of August and most of the crop had already been purchased the further fall in price did not affect the producers much. The amount of the crop grown in any one year is very difficult to estimate but when a good price is offered a crop well above the average in quantity is harvested. If the price is low, much ginger is allowed to remain in the ground till the following season.

17. The quality of ginger was maintained at a satisfactory level, due to propaganda and inspection by the department, and a drier and less mouldy product was exported. Producers are being slowly educated into drying their ginger thoroughly.

Exports :—

				Tons exported.	£
Average	1920-29	...	...	1,582	56,778
	1930	...	...	1,972	57,228
	1931	...	...	1,927	32,518
	1932	...	...	1,383	22,877
	1933	...	...	1,545	16,543
	1934	...	...	1,659	23,254
	1935	...	...	1,506	36,918
	1936	...	...	1,642	58,672
	1937	...	...	2,384	97,622

18. *Piassava*.—There was a slight falling off in the quantity of piassava exported but the quality was well maintained and a markedly higher average price was obtained. This was due in part to the increased exports from Bonthe, which during 1937 rose to 1,062 tons while the exports from Sulima fell off slightly; but reports from the latter station show that there was a greater amount of piassava than usual awaiting shipment at the end of December. The following table shows exports from all areas :—

				Exports from all Areas.	
				Tons.	£
Average	1920-29	...	...	1,645	22,707
	1930	...	...	2,417	36,582
	1931	...	...	3,150	31,846
	1932	...	...	2,877	23,290
	1933	...	...	3,499	30,108
	1934	...	...	3,659	30,390
	1935	...	...	3,438	30,997
	1936	...	...	3,528	32,776
	1937	...	...	3,392	43,609

19. The prices for Sherbro and Sulima piassava still show a very marked difference. The average value for Sherbro last year was given as £20 1s. 0d. per ton (f.o.b.) while the corresponding price for Sulima piassava was £9 10s. 0d. Both show a marked improvement on previous years. For Bonthe this means getting back to the pre-slump prices, but for Sulima the prices exceed those of the period preceding the slump and this is very satisfactory.

20. The following prices show the production in the two main areas :—

Sherbro Area.

				Tons exported.	Value.	Local Price per ton.		
					£	£	s.	d.
1930	...	...	...	663	14,356	21	11	0
1931	...	...	...	748	10,914	14	12	0
1932	...	...	...	615	8,440	13	14	0
1933	...	...	...	1,415	15,232	13	6	0
1934	...	...	...	852	13,575	15	19	0
1935	...	...	...	1,096	16,015	14	14	0
1936	...	...	...	798	11,261	14	1	0
1937	...	...	...	1,062	21,468	20	1	0

Sulima Area.

1930	...	...	...	1,754	12,226	7	0	0
1931	...	...	...	2,402	20,932	8	14	0
1932	...	...	...	2,262	14,850	6	12	0
1933	...	...	...	2,354	14,256	6	1	0
1934	...	...	...	2,807	16,815	5	18	0
1935	...	...	...	2,342	14,982	6	8	0
1936	...	...	...	2,760	21,515	7	16	0
1937	...	...	...	2,330	22,141	9	10	0

21. There appears little variation in the proportions of piassava exported from the two areas, and both appear to be increasing exports at approximately the same rates. The following shows the proportions for each area :—

				Sherbro Area per cent.	Sulima Area per cent.
1930	...	...	...	27·5	72·5
1931	...	...	...	23·7	76·3
1932	...	...	...	21·4	78·6
1933	...	...	...	32·8	67·2
1934	...	...	...	23·8	76·2
1935	...	...	...	32·8	67·2
1936	...	...	...	22·7	77·3
1937	...	...	...	31·5	68·5

22. *Cocoa.*—The export of cocoa has fallen off a little but this is probably due to the falling off of the price during the second half of the year which discouraged production. 265 tons valued at £8,830 were exported and although this is not a record for quantity it is easily a record for value exported. The price opened at 3d. a lb. (Freetown) and the cocoa came in so rapidly that by the end of March 229 tons had been exported compared with 118 tons in the previous year. A record year was expected but production fell off and only reached the figure given above,

23. The quality of the cocoa has improved during the last two or three years and the following report from their Principals in England to one of the leading firms operating in Sierra Leone is quoted as emphasising this—

"Sierra Leone Cocoa.—We noticed a marked improvement in the 44 tons received by the "Ebani." We cannot say yet that the quality is equal to the Lagos cocoa but it is well fermented and the slaty beans were not more than twenty-five per cent. We counted about fourteen defective beans but not in the bad state that we have had them previously. Fermented cocoa, as you know, ought not to deteriorate, and we think the damage in these fourteen beans is due to mould rather than to germination although in some of the beans there were traces of larvæ."

24. The greater part by far of the cocoa was produced in the high bush area in which Kenema, Segbwema, Daru and Pendembu are now the principal buying centres—

Exports :—

		Tons exported.	£
Average 1920-29	...	43	1,475
1930	...	80	2,548
1931	...	61	1,034
1932	...	81	1,295
1933	...	67	990
1934	...	138	1,755
1935	...	164	2,043
1936	...	301	5,542
1937	...	265	8,830

25. *Coffee.*—There was a marked increase in the amount of coffee exported. In 1936, 13·5 tons were exported but in 1937 this had risen to 58 tons. The quantity is still small but a reference to the exports since 1920 shows a marked increase of recent years. The figures are as follows :—

			Tons exported.	£
Average 1920-29	...	...	4	356
1930	...	...	5	189
1931	...	...	7	237
1932	...	...	2	65
1933	...	...	3	96
1934	...	...	8	247
1935	...	...	11	299
1936	...	...	13·5	324
1937	...	...	58	1,201

26. Although the amount of coffee exported is still small it has now been established that coffee can be grown at a low cost in certain areas and the development of this crop will be carefully studied.

27. *Cattle*.—There was an appreciable increase in the quantity of hides exported in 1937. Altogether 1,281 cwts. of hides were exported and this is the highest for many years. The exports since 1929 are given below :—

			Cwts.*	£
1929	...	...	876	4,654
1930	...	...	840	2,853
1931	...	...	620	1,687
1932	...	...	540	1,223
1933	...	...	580	987
1934	...	...	440	692
1935	...	...	388	1,156
1936	...	...	603	1,821
1937	...	...	1,281	4,854

28. There is also a steady increase in the amount tanned locally and although the export of untanned hides is still much greater in quantity than tanned hides the values are not very different. Hides are also tanned for a small local market.

Exports :—

		Tanned Hides.		Untanned Hides.	
		Cwts.	£	Cwts.	£
1935	...	124	770	263	374
1936	...	192	1,197	411	624
1937	...	249	2,029	1,032	2,825

29. *Beeswax*.—There was a slight falling off in the export of beeswax due, it is thought, to unfavourable conditions for bees. During 1937 only 33 cwts. were exported :—

			Cwts.	£
1934	...	...	15	65
1935	...	...	37	182
1936	...	...	58	287
1937	...	...	33	175

30. *Garden Crops*.—The production of foodstuffs other than rice still steadily increases and proved a great asset during 1937, when, owing to a shortage in the rice crop, other foods were required by producers for their own consumption. As might have been expected the amount of these crops carried on the Railway showed some falling off as they were consumed in greater quantity by producers. The figures for all foodstuffs (other than rice) carried on the Railway were :—

Year.		Tons.
1926	...	1,902
1927	...	2,517
1928	...	2,297
1929	...	2,382
1930	...	2,113
1931	...	2,746
1932	...	2,897
1933	...	2,539
1934	...	3,938
1935	...	3,127
1936	...	3,641
1937	...	3,087

* Wherever the word "cwts." is used in this Report it means "Long cwts."

31. The Moyamba District in spite of its bad rice crop produced the larger proportion of the supplies. Mano fell off rather badly but it was in this area that the rice crop failed most. The amounts of these crops railed from individual stations in the Moyamba District are :—

Year.	Mano, Tons.	Kanga- hun, Tons.	Moy- amba, Tons.	Bauya, Tons.	Roti- fuuk, Tons.	Brad- ford, Tons.	Mabang, Tons.	Total Mano- Mabang, Tons.
1926 ...	88	65	19	18	93	33	61	379
1927 ...	122	84	44	35	159	50	97	591
1928 ...	115	46	45	52	51	24	29	362
1929 ...	104	52	56	22	77	12	29	352
1930 ...	114	74	51	32	130	51	14	466
1931 ...	175	96	130	31	197	77	99	805
1932 ...	417	89	112	37	366	61	72	1,154
1933 ...	295	85	89	37	295	59	59	929
1934 ...	782	313	242	141	140	261	134	2,013
1935 ...	603	151	241	185	150	237	197	1,764
1936 ...	510	239	224	259	206	385	360	2,183
1937 ...	308	197	166	365	139	205	371	1,751

SECTION II—WORK OF THE DEPARTMENT OF AGRICULTURE.

32. *Policy.*—The following is a summary of the agricultural policy now adopted by Government :—

A. The adequate provision of food for the people.

This is to be accomplished by—

- (i) The improvement and spread of swamp rice cultivation to such an extent that not only will the needs of the people be adequately supplied in a bad year but there will be a surplus for export in ordinary years.
- (ii) The better cultivation of inland swamps and valleys and the introduction of the cultivation of crops, other than rice, in swamps during the dry season.
- (iii) The extension of garden crops to serve as an auxiliary food supply.
- (iv) The selection (or introduction) and distribution of seeds and plants suitable for (i) to (iii).
- (v) The improvement of poultry and stock.

B. The cultivation of money crops or exploitation of wild trees for export purposes. These crops or products include—oil-palms, cocoa, coffee, rice (*see A (i)*), ginger, kola, chillies, fruits and piassava.

- C. The arresting of the degradation of the forest growth of Sierra Leone, or at any rate increasing the regeneration period between successive "brushings" of the same area, by—
 - (i) encouraging swamp and valley cultivation as an alternative to upland farming.
 - (ii) investigating means of establishing a more permanent form of upland farming than the present "shifting cultivation."
- D. The improvement in the preparation and marketing of produce. This includes—
 - (i) the use of rice milling machinery
 - (ii) introduction of co-operative methods in Scarcies rice area with a view to narrowing the gap between the prices paid by producers and those by consumers to the mutual advantage of both.
- E. The preservation of the standard of export produce by inspection. Produce for which standards are already fixed are palm-oil, palm kernels, piassava, ginger, raffia, rice and fruit.
- F. Co-operation with the Education Department where possible in the teaching of agriculture.
- G. All extension work and propaganda must be based on the results of experiments and experience obtained by Agricultural Officers within Sierra Leone.

33. Lack of staff, due partly to sickness, still handicapped the department in the first part of the year but by the second half of the year the return of officers from sick leave enabled a normal staff to operate. In fact, by the latter end of 1937, a greater number of officers than normal was in the Colony and advantage was taken of this to carry out inspections and surveys which had long been held up. The most important of these were surveys of possible wetland rice areas. In the Southern Province Mr. G. M. Roddan commenced a survey extending from the Ribbi to the Bagru River. In the Colony Peninsula Mr. H. Macluskie was busy on the area Campbell Town to the Ribbi River while in the Northern Province Mr. R. R. Glanville was adding to our knowledge of the Scarcies and Port Loko areas. Altogether it would appear that in the areas indicated above there are probably over 100,000 acres of unused land which could be developed for wetland rice. With water control (irrigation and drainage) it is thought that this area could be considerably increased both in total area and in the yield per acre.

34. The importance of this line of development will be understood when it is realised that the present production of rice in Sierra Leone is mainly from dry land farming; that the system of farming employed is that of "shifting cultivation" in its worst form, that is, farming land for one year only and then moving on; and that under this system of cultivation the vegetation is rapidly deteriorating, erosion is severe especially on the steeper slopes, and the land is becoming progressively less fertile. Less than five per cent. of forest remains in Sierra Leone—a country that was once nearly covered with rain forest. The amount

of high bush left is probably not more than twenty-five per cent., while grass, assisted in its progress by annual fires, is spreading down from the north. It is impossible to exaggerate the importance of this question of erosion and plant deterioration resulting from shifting cultivation. Something must be done at an early date to replace, at least to some extent, the demands and dire effects of shifting cultivation.

35. There are two possible methods of attacking this problem. The first is by devising a method of dryland farming which preserves the fertility of the soil. This problem is being tackled at Njala ; it is a difficult one and may prove impossible of solution in a country with a high and badly distributed rainfall, lateritic soil, hilly and undulating country for the most part, and tsetse fly in the southern and less hilly half of the country. We are, however, methodically testing out the possibilities at Njala of growing rice in rotation with cover crops to see if the latter, while providing either food for man or fodder for animals, can preserve the fertility of the soil. The experiments as designed will naturally take a number of years to complete, but one of the difficulties experienced is the erosion which always occurs on land prepared for rice during the frequent torrential downpours before the rice establishes a cover for the soil.

36. The second method is not so much by attacking as avoiding the problem of shifting cultivation on the uplands, and this is by the development of swamps. In the past we have only been nibbling at this problem but as staff becomes available it is being systematically investigated. It has been indicated above that surveys of swamp areas were being conducted during the latter part of 1937 : by the end of 1937, the preliminary reports of the officers concerned had indicated large areas in the Southern Province and the eastern end of the Colony Peninsula as suitable for rice. Moreover, thanks to the assistance of the Royal Air Force and later on to that of the Royal Navy, the Director was able to make flights over the Scarcies, Port Loko and Ribbi areas, and these flights emphasize these points :—

- (a) Only about half the swamp area in the Scarcies is cultivated,
- (b) there are enormous areas of swamps almost untouched in the Moyamba District, and
- (c) the vegetation on the uplands in the area visited is being destroyed at an alarming rate.

37. Enquiries with regard to the Scarcies area established the fact that many areas, quite a long way up the river, were undeveloped on account of salt or excessive water. It would appear a comparatively easy matter to reclaim some of this land and a scheme was drawn up to enable an irrigation and drainage engineer to make a thorough survey of the possibilities of this and other areas. This scheme was deferred for further consideration in 1938 by which time it will be possible, it is hoped, to obtain further information both of the Scarcies and of other parts, and to prepare maps from preliminary surveys indicating promising areas.

38. *Survey of Vegetation.*—No survey of the vegetation of Sierra Leone has yet been published but the Agricultural Department, with assistance from Administrative and Forestry Officers, has at last been able to compile a preliminary survey of the major types of vegetation. The vegetation has been divided into the following main groups :—

Forest :—

High bush—generally over 25 feet high

Low bush—generally under 25 feet high

Orchard bush—isolated trees or patches of bush with grass between.

Swamp :—

(a) inland

(b) tidal including mangrove.

39. The areas covered by each group have been mapped and these areas, if not meticulously accurate, are approximately so. After mapping these areas it was estimated that the area covered by each type of vegetation was as follows :—

Forest	...	...	5 per cent.
High bush	...	...	20 to 30 per cent.
Low bush	...	...	25 „ 35 „
Orchard bush	...	...	25 „ 35 „
Swamp	...	...	10 „ 20 „

40. It is impossible to give more accurate figures since high bush shades into low bush, low bush into orchard bush and so on, but the alarming feature is the almost complete disappearance of forest—except in the small reserved area—and the rapidity with which the high bush is disappearing. Another alarming feature is the encroachment of grass from the north. This is due not only to shifting cultivation but to the annual fires which appear to be less detrimental to grass than to bush growth; and wherever grass creeps in to a certain extent in any area the annual grass fires gradually effect the destruction of the bush.

41. The effect of the condition of the vegetation on production can be observed if a study is made of the export crops and the areas from which they are derived. The Railway and Customs figures prove conclusively that palm kernel production is far greater in the high bush area than in the low bush or orchard bush. This, it is thought, is due to the repeated burnings which the oil-palm is subjected to in low bush and orchard bush areas. Cocoa failed in certain areas in the Southern Province but succeeded in others. The vegetation survey disclosed the reason. The area in which cocoa failed was low bush and the area in which it succeeded was high bush. Cocoa cannot apparently stand the desiccating effects of the dry season in the low bush country but thrives reasonably well in the high bush country; it cannot of course be grown in the orchard bush area. Coffee also does better in the high bush country but ginger thrives well enough in the low bush country.

42. Different types of swamp vegetation were encountered, the three chief being mangrove, raffia and grass swamps. All these under certain conditions are suitable for rice and a study of the natural vegetation may give a useful guide as to the types of rice most likely to be suitable in the different areas.

43. The survey also showed that the steep slopes in the Northern Province more rapidly lost their vegetation under shifting cultivation than the flatter slopes of the south although the rainfall (90" a year) was less than in the south where the precipitation may go up to over 140" (Freetown 147"). An examination of this area shows that erosion of the soil is very severe on the hill slopes and it is thought that the soil wash in this area provides more severe conditions for tree growth to contend with than those which prevail in the wetter though less hilly slopes in the Southern Province.

44. In carrying out its work the Agricultural Department has to bear in mind the above conditions, namely, the erosion of the soil and the destruction of vegetation consequent on shifting cultivation, the condition which the vegetation has reached in various parts of the country, and the methods which can be employed to augment production without leading to further deterioration of the soil.

45. In this connection it should be clearly understood that we have as yet no method of agriculture with which to replace shifting cultivation on dry land farms, but we have considerable information with regard to the cultivation of swamp which allows for the increased production of rice and other foods, without the progressive deterioration of the soil involved by shifting cultivation on dry land areas. Our immediate object, therefore, is the development of the swamps for food production with a view to decreasing the calls made on dry land farming. If full use (and full use will eventually involve water control) can be made of the swamps it is possible that in time the danger to the countryside from shifting cultivation will be rendered negligible. In the meantime, while concentrating on food production in swamps we are not neglecting to investigate methods of permanent cultivation on dry land farms, and in this connection we are studying money as well as food crops.

NORTHERN PROVINCE.

46. Mr. G. M. Roddan was in charge of the Province until Mr. R. R. Glanville returned from leave on 16th August. Mr. A. F. Mackenzie assisted from 1st January to 18th April and Mr. E. S. Garner from 15th July to the end of the year. The Agricultural Headquarters of this Province are at Rokupr and all officers were stationed there. The chief work of the department in the Northern Province was the work on rice in the Scarries areas and this was carried on with customary vigour.

47. The rains were about normal in amount. They were a little late in starting but continued until later in the year, the distribution being more even than usual ; as a result the rice crop was about a fortnight late in being harvested.

48. The weather conditions generally, however, were favourable for upland farms but in some places this benefit was counteracted by delayed sowing on account of the fear of locust damage. The upland rice crop, nevertheless, can be considered normal. The ground-nut crop was below normal ; the area was slightly less and the weather conditions were unfavourable. The production of root crops was above normal ; there was an increased area under sweet potatoes, yams and cassava. Production of rice from wetland farms was definitely above normal, the area planted being greater and the yields good.

49. The work in the Scarcies area during the later part of the year was greatly facilitated by the use of a motor launch which has now been placed at the disposal of the department. During the period October 15 to the end of the year over a thousand miles were covered by this launch and it has very quickly been proved that the possession of a launch is an essential feature of efficient work in the Scarcies. It enables the Agricultural Officer to cover three times the area he could otherwise cover and to cover it much more thoroughly.

50. *Rice*.—The seed distribution scheme, started in 1935, continues to be a great success. In the year under review 1,663 bushels* of improved seed were distributed to 506 new farmers in the Scarcies area alone, while smaller quantities were distributed in the Port Loko creek and other districts. The terms under which seed rice is advanced to farmers includes the return of 5 kettles† of seed rice for every 4 kettles advanced, and not only is seed being distributed each year but an increasing seed supply is being built up. Farmers who receive rice on loan are required to rogue that part of the farm from which the seed is to be obtained and this assists in keeping the seed pure. The seed distributed in 1937 included 1,516 bushels of G.E.B. 24, 52 of Co. 7 and 27 of Kavunginpoothala. G.E.B. 24 rice has proved extremely popular with the farmers in the Scarcies and is rapidly improving the quality of the Scarcies crop. It is impossible to give definite figures of the amount of this rice now raised in the Scarcies but at least 20,000 bushels have already been received this season by the Rice Mill for cleaning. The total amount grown, it is thought, far exceeds this quantity.

51. While G.E.B. 24 has proved very popular as a medium length maturity rice, other varieties, more especially Co. 7 and Kavunginpoothala, are appreciated for different conditions; Co. 7 is a rice with a longer period of growth and Kavunginpoothala is more suitable for the deeper swamps.

52. *Yams*.—The distribution of seed is not confined to rice and there has been a continued demand for yams. During 1937—3,334 lb. of yellow yams, 1,392 lb. of Jaffna King yams and 346 lb. of Chinese yams were distributed; a total of 5,072 lb. as compared with 2,971 lb. in 1936.

Recipients of seed yams have to return a quantity of seed at the end of the season equivalent to that received plus twenty-five per cent. In this way an increasing seed supply is being built up with yams as with rice and the farmers themselves appear most willing to take advantage of this form of distribution.

53. *Coffee*.—In the Bombali and Tonkolili Districts interest in Robusta Coffee is still being taken. Some 100 plantations are now in bearing and during the year 76 farmers, 41 of whom are in Bombali and Tonkolili Districts were assisted to make plantations. In addition 18 new coffee nurseries were made. These plantations are perhaps not plantations in the accepted sense of the word, but are small plots varying from 10 to 100 trees planted under natural shade not far from the owner's house.

* One bushel = 60 lb. weight of paddy.

† One kettle = 15 " " "

54. *Poultry*.—Pure bred poultry are being kept at two stations, Rhode Island Reds at Rokupr and Brown Leghorns at Makeni. These have been a source of considerable interest to local farmers and there is a great demand (greater than the supply) for eggs for sitting. In most cases good hatches were obtained, although the mortality among the chicks was high on account of the difficulty of protecting them from hawks. The success and interest shown during the past year have led to plans for increasing the work.

55. *Ploughing*.—Ploughing is now firmly established in the Mabole valley of the Biriwa Chiefdom. It has not been possible to survey accurately the area covered in 1937 by the plough but it was definitely over 100 acres. At the present time there are only 8 plough owners but many more benefit by borrowing ploughs. Most of the ploughing is of course being done in the swamp and increased production with a less expenditure of labour has resulted. G.E.B. 24 has proved a very suitable rice for these swamps and is now the chief variety grown. It is unfortunate that during the last few years, shortage of staff has prevented Agricultural Officers from devoting more time to the development of this branch of agriculture. This will shortly be remedied.

56. *Extension Work*.—Extension work in the Northern Province apart from that in the Scarcies area is a little difficult to supervise but in spite of this encouraging progress was made. The chief assistance afforded to farmers by Instructors was connected with the extension and improvement of wetland rice cultivation. In addition, farmers were assisted to make coffee and oil-palm nurseries and plantations. Correct methods of maintenance are being demonstrated, and plantation owners having coffee in bearing were shown how to prepare the berries for market. With regard to new varieties of annual crops farmers were assisted to get material from the various stations. The distribution of planting material is shown in Appendix VIII and during the year over 1,000 farmers received direct assistance in the Northern Province. In connection with wetland rice, Instructors have spent much of their time in improving production and quality. This is being done by supplying first class seed of good quality rice suitable for varying types of swamps. The greatest concentration on this work, as indicated above, has been in the Scarcies area where 1,663 bushels of seed were distributed to 506 farmers. In addition 121 bushels were distributed to farmers in the Port Loko and 47 bushels in other districts. G.E.B. 24 rice gave excellent results in inland swamps as well as tidal areas. Forty bushels Kavunginpoothala were given to farmers for planting and gave very satisfactory results in nearly every case.

57. *Pests*.—Locust swarms again made their appearance in January in the Karene and Port Loko Districts and were present till early in July. No damage was done by the early swarms but the hoppers which hatched out in May did considerable damage to rice nurseries and early upland rice farms chiefly in the Karene District. Most of the damaged farms recovered to a great extent, but it was estimated that damage equivalent to a reduction in crop area of five per cent. was caused in the Karene District. The swarms from the hoppers in May had, by early July, either flown away or been destroyed by the heavy rains.

58. *Diseases*.—The incidence of *Piricularia* which is often such a serious disease on rice nurseries was unusually light.

59. *Co-operation.*—In 1936 a Farmers' Society was started at Mambolo on the Great Scarcies, the object of which was to test the response of farmers in that area to co-operative ideas and methods. The first year's working, as described in my last report, proved so satisfactory that there were demands from other native farmers to be included in the society at Mambolo, followed by demands from other towns for the formation of other societies in those areas. In view of lack of staff, however, it was impossible to do more than increase the Mambolo Society and to form one new society at Kichom. In 1937 the membership of the Mambolo Society was increased to thirty and a new society with a membership of thirty-six was started at Kichom. The marketing of the crop is still in progress but over 7,000 bushels of rice have already been sent to the Rice Mill and the total amount is expected to exceed 9,000 bushels (this should be compared with 2,000 bushels marketed during the first year by the Mambolo Society). The greater part of the rice marketed by the societies is G.E.B. 24; pure seed being supplied from Rokupr as required.

60. There are excellent prospects for extending this movement and there are already sufficient applicants to form three new societies. In the 1938 estimates, provision was made for an Agricultural Officer for work in the Scarcies in 1938, and it is hoped that with his arrival, and the provision of the necessary supervision and legislation, that this movement will rapidly expand.

61. *Rokupr Rice Research Station.*—The report of this station is attached as Appendix I, and it will be seen that much good work is being done. Pure-line selection work is being continued with encouraging results and four introductions from Burma are very promising, one of them, Ngasein, particularly so. This station still continues to be an object of much interest to surrounding farmers both as a model of clean cultivation and a source of valuable varieties of rice.

SOUTHERN PROVINCE.

62. Owing to shortness of staff, work was again curtailed in the Southern Province during the early part of the year. Mr. J. W. D. Fisher was in charge single-handed until July when Mr. E. I. Nisbett took over and it was not until September when Mr. G. M. Roddan was posted to the Province followed in October by Mr. A. F. MacKenzie that more than one Agricultural Officer was available for work in the Province. No fresh lines of investigations were therefore possible at Njala but those already started were continued. It was also impossible to give the supervision required to extension work by Agricultural Instructors during the first part of the year.

63. *Rice.*—G.E.B. 24 was introduced to the Southern Province and distributed to 20 farmers in 1936. The result has been an increasing demand for this variety of rice which has resulted in the distribution of 419 bushels of rice to 273 farmers. The greater part of this seed was distributed in the Moyamba District, 350 bushels being distributed between 200 farmers. The remaining 69 bushels were distributed to 73 farmers in the eastern part of the Province chiefly in the Kailahun and Kenema Districts where wetland rice cultivation is now fairly well established. Generally speaking, the results were satisfactory, good crops being reaped on most of the farms planted under the supervision of the department, returns varying from twenty—to fifty-fold.

64. A serious shortage of seed was experienced by farmers in the Moyamba District and in addition to the G.E.B. 24 other varieties of wetland rice were sold to farmers. A further 400 bushels of seed of upland varieties were also supplied to ease the situation.

65. A survey of the potential rice swamps in the Moyamba District, held up during 1936 by shortage of staff, had been resumed by the close of the year. Mr. G. M. Roddan was in charge of this work and had made considerable headway before the end of December.

66. *Oil-palms*.—A well stocked nursery containing Deli palms the progeny of high yielding parents, has been established at Njala for distribution to farmers. A nursery has also been made in the Kailahun District. These Deli palms have shown themselves vastly superior to local varieties and they are eagerly sought for by native farmers. Experiments are also being continued with oil-palms imported from Angola which have given most promising results and we are breeding from the best of these palms; we hope to raise palms which may well surpass the Deli imported from Sumatra.

67. *Ginger*.—Further efforts were made to improve the quality of ginger. Three Agricultural Instructors were again employed in the ginger producing chiefdoms during the season. They stressed the need for better cleaning and thorough drying after scraping the roots. The exporting firms agree that a great deal of success has been obtained by these efforts. There was a demand for planting material from a new area—Kailahun District—and 30 farmers were supplied with seed.

68. *Cocoa*.—Interest continued to be taken in cocoa and some 265 tons were exported from the Southern Province. Propaganda and instruction with regard to the preparation of cocoa was continued and appeared to be bearing fruit. It is hoped that the provision of additional staff will enable the cultivation of cocoa to be extended in the near future.

69. *Coffee*.—The work during 1937 was mainly confined to caring for existing plantations in the Kenema, Kailahun and Moyamba Districts. Very little new work was undertaken and only 70 new plantations were made involving 4,516 plants. Farmers owning plantations which were in bearing were instructed in the preparation of the berries and there was a considerable increase in the production of coffee during the year.

70. *Citrus*.—The eradication of citrus scab in the Southern Province was continued and the Province is now practically free from the disease. At Njala investigational work on this crop still continues and this is being further assisted by the acquisition, very late in the year, of a small canning plant which will be used during 1938 for canning experiments.

71. *Garden Crops*.—The cultivation of garden crops proved a great asset to this Province during 1937 owing to the fact that the rice crop was so much smaller than usual. In spite of the extra demand made locally on garden produce, the Moyamba District was still able to export over 1,700 tons of native foodstuffs and this, in a year of local rice shortage is a very considerable achievement.

72. *Poultry*.—A scheme for the improvement of village poultry was started at Gbenderu near Kenema in 1936 and was continued throughout 1937. As this appeared likely to be successful, demonstrations on similar lines were started at Sefadu Barracks in the Kono District by the District Commissioner and at Kinse village near Sefadu. In these trials all the native male birds were removed and replaced by pure bred or $\frac{3}{4}$ bred Rhode Island Red cocks. After the first half bred generation had been raised, all the cocks were again removed and replaced by an unrelated strain of Rhode Island Red cocks. The results at this stage are distinctly promising and it would appear that this may form a very suitable method of improving poultry in Sierra Leone. The Rhode Island Red has been a very successful introduction and numerous applications (far too many to be fully supplied) for breeding fowls and hatching eggs are received.

73. *Livestock*.—The Livestock Officer arrived in September and carried out a number of tours in the Southern and Northern Provinces with the object of investigating the livestock industry and examining possible sites for a stock farm. Information is being collected regarding the extent of cattle breeding and the number of cattle entering the country for slaughter. The Livestock Officer is not confining his attention to cattle but is investigating the possibilities of sheep, goats and pigs.

74. *School Gardens*.—A number of schools were assisted by free supplies of planting material and Agricultural Officers whenever possible visited schools and advised teachers with regard to the proper keeping of such gardens. Particular attention was paid to Bo School where poultry-keeping has been added to the activities of the school.

75. *Njala Research Station*.—The report of this station is attached as Appendix II. The chief experiments are those concerned with the maintenance of fertility, the object of which is to see if green cover crops, which either afford food for man or fodder for animals can be grown in rotation with rice without deterioration of the soil. These are important experiments and will take a number of years to complete.

76. In 1937 pure line selection work with upland varieties of rice was started. Although shifting cultivation is undoubtedly bad, there is no doubt that it will remain the usual agricultural method in this country for many years. It is therefore necessary to make the best use of the land thus cultivated by supplying rices of higher yield and better quality than those at present cultivated. This work will, therefore, be carried on from year to year in the hope of producing better kinds of rice.

77. Some success has been obtained by the introduction of various types of chillies including Japanese Bird's Eye, Hontaka, Portuguese West African and Swef Jap. All these appear to be promising. Black pepper, however, has not yet been a great success and a more suitable type of shade must be found to carry it over the extremely dry season from December to April.

COLONY PENINSULA.

78. Mr. E. I. Nisbett was in charge of the agricultural work in the Colony Peninsula until the arrival of Mr. H. Macluskie on June 26th. Mr. Macluskie then took charge.

79. *Rice*.—Rice is becoming more and more important in the eastern part of the Peninsula and there has been an appreciable increase in the acreage during the past year. This increase is in swamp rice cultivation for which the low-lying eastern part of the Colony is particularly suited owing to the prevalence of inland and tidal swamps. During 1937 some 284 bushels of seed rice were distributed and 154 new farmers were given assistance, bringing the total number of farmers assisted in this area up to 528.

80. The development of swamp rice cultivation has taken a most interesting turn at Salt Pond. There, faced with good mud flats but salty water (owing to the tide) late in the season, farmers have "empoldered" their land by enclosing it in mud walls to keep out the sea water. The results have been most successful and some 700 acres have been brought into cultivation in this manner.

81. *Cassava*.—This crop is grown all over the Colony hills in the western area and over most of the upland slopes in the eastern half of the Colony Peninsula. It is in fact the only crop which can now be grown on a large proportion of the heavily leached and badly eroded soils in the Peninsula, and the continued cultivation of this crop on the upland areas is causing a steady deterioration of the soil which will only stop when the soil can no longer support this form of cultivation. This position has been reached in many places and even in the best places only a meagre living can now be extracted by this form of cultivation. Hill sides once covered by forest, are now stony slopes with the rock exposed through the eroded surface soil. Nothing short of many years bush regeneration will bring these hills into a satisfactory state again, and it may shortly be necessary to reserve and afforest a greater proportion of the hill slopes of the Colony Peninsula than is at present reserved, purely from the point of conserving a satisfactory water supply.

82. *Fruit Trees*.—A great deal of interest is taken in fruit trees but the Colony farmers on the whole do not appear to be prepared to take any great care of them and those that exist are in a very uncared for state.

83. *Mangoes*.—Mangoes flourish in spite of everything and if these could be improved in quality they might furnish a money crop. Experiments were made on top-working old trees during the latter half of 1937. These have not been very successful but this may be due to the fact that work could not be started till late in the season. This line of investigation will be continued.

84. Seedlings have been raised on the Mill Farm and budded stock will be raised using imported trees of good varieties as parent stock.

85. *Cashews*.—An experimental plot has been raised at Newton and these appear to be full of promise and make light of the difficult soil conditions. The difficulty is to prepare the nuts for market and various methods are being investigated.

86. *Cinnamon*.—An attempt to raise a plot of cinnamon on the sandy soils at Newton has so far not been a success and it is doubtful if cinnamon can be raised under these conditions.

87. *Bananas*.—Great interest has been shown in the cultivation of bananas and would-be planters have approached Government for assistance. It is accepted as proved that in certain localities, where water is available, Canary bananas can be raised without any real difficulty. The presence of banana disease makes the growing of Gros Michel a risky proceeding. This department is enquiring carefully into the matter but before making any further recommendations must be satisfied :—

- (a) that Canary bananas can be transported to the English market in a satisfactory manner and at an economic rate,
- (b) that there is room on the English market for further supplies, and
- (c) that arrangements can be made for weekly shipments in vessels provided with cold storage.

88. *Citrus*.—The chief problem pursued has been the elimination of scab by pruning and spraying. This disease has now been nearly eliminated but careful examinations have still to be carried out to see that in no instance has the disease been overlooked.

89. *Vegetable Gardening*.—Considerable interest is taken in the growing of vegetable in the hill villages for the Freetown market. This form of agricultural activity takes place only on a small scale and is not capable of much expansion owing to the lack of suitable land. The department has however given great assistance by the distribution of suitable seed and by advice on care and manuring of these small vegetable farms.

90. *Pineapples*.—Investigations are still being continued at Newton and steps are being taken to raise pines in sufficient quantities for commercial shipment.

91. *Departmental Stations in the Peninsula*.—There are two agricultural sub-stations in the Peninsula, Newton and Cline Town. At Newton work is limited at present to pineapples and bananas with some attention to cashew, avocado and cinnamon. The Agricultural Officer, who has been carefully studying conditions in the eastern part of the Peninsula, is preparing plans for the future development of this station to make it of more general assistance to farmers in that area.

92. At Cline Town the departmental farm adjoins the Rice Mill and offal, such as rice meal and burnt husk, is available as manure. Experiments with chillies, black pepper and various kinds of vegetables are being carried out while the farm also serves as a place for raising budded stocks of mangoes and avocados and supplies of planting material of cashew, pineapples, etc.

93. *Sierra Leone Agricultural and Commercial Society*.—The Annual Show organised by this Society during February was a success, a record number of exhibits being sent and a definite improvement in quality being noted. The society serves to foster an interest in agriculture, particularly fruit and vegetable growing, by conducting competitions and by importing seed supplies on the behalf of farmers. The Agricultural Department assisted the society in the organisation of the show and in the judging of exhibits, and staged an exhibit of agricultural crops and products which was of great interest and educational value to visitors to the Show.

RICE MILLING.

94. The Rice Mill at Cline Town had a most encouraging season. 34,209 bushels of husk rice (paddy) were received for milling; this is 22,486 bushels more than it received in the previous year. Storage accommodation proved so inadequate that a further building was approved for 1938. Of the rice received, 29,470 bushels were milled, the rest being in store awaiting milling on December 31st.

95. No pests were noted among rice during storage and losses from shrinkage only amounted to 179 bushels, or .5 per cent. of the total quantity received. This shrinkage (loss of moisture) is very small and can only be accounted for on the assumption that the normal loss in weight of rice by drying, which inevitably occurs during storage, is made up by replacing the water when the rice is parboiled for milling.

96. The amount of rice recovered in milling was very satisfactory. From 29,470 bushels (60 lb. to a bushel) of husk rice milled, 14,091 bushels (84 lb. to a bushel) of clean rice were obtained. This is equivalent to 66.9 per cent. by weight and covers both parboiled and dry milled rice alike.

97. From 100 lb. of husk rice milled, taking the average of the whole year, the recovery of rice was as follows:—

Clean rice (including half broken)	=	66.9 lb.
Quarter broken rice	=	2.5 „
Meal (pericarp from the cones) ...	=	10.4 „
Husk and dirt	=	20.2 „

98. This high rate of recovery is only possible by not cleaning the rice to too great a degree. The Medical Authorities have recommended that, from the point of view of nutrition, it is undesirable that all the pericarp should be removed from the rice. Our object in milling for the local market is, therefore, to clean the rice only to such an extent that no further cleaning is necessary by the housewife and a certain proportion of pericarp is left on the grain.

99. The quarter broken rice, which is in a fine stage of division, is in demand as chicken food. The rice meal might be used for the feeding of stock, but at present there is not an appreciable demand for this product and it is being used as fertiliser both by itself and when mixed with a proportion of burnt husk from the parboiling plant. It has proved an excellent fertiliser in vegetable and flower gardens.

100. *Capacity of Mill.*—The Mill is well able to mill 300 bushels in an eight-hour day but the parboiling plant has so far only been able to deal with an average of about 200 bushels a day and this is due to the fact that the drying floor is not large enough. An extension has therefore been commenced and it is hoped that we shall shortly be able to dry 250 bushels a day. While this amount of parboiling keeps the mill going during the dry season (there is a certain amount of dry milling done) the question of drying the paddy after parboiling during the rains is a serious problem. The local demand is chiefly for parboiled rice and consumers are reluctant (and rightly so) to accept the dry milled article. The question of artificial drying is therefore being investigated and it is possible that a drying plant will have to be installed before the mill can be regarded as a satisfactory unit for milling rice all the year round.

101. *Popularity of Mill-cleaned Rice.*—There is no doubt about the popularity of mill-cleaned rice. Consumers are prepared to pay a premium of from 6*d.* to 1*s.* a bushel for it and this is perhaps the best criterion of its popularity. The rice is well cleaned, it requires no further work to be spent on it as does native cleaned rice, and it is not subject to the further loss of cleaning which is always experienced with native cleaned rice. This has resulted in an increase of business to the mill and the mill was worked to capacity of its parboiling and storage during 1937. There is every reason to suppose that it will continue in successful operation if the problem of drying can be successfully overcome.

102. The accounts which show a small profit are given in Section III—Finance.

INSPECTION OF PRODUCE.

103. The inspection of produce continued as usual throughout the year and the report of the Inspector of Plants and Produce is attached as Appendix III.

104. In May, 1937 following a recommendation from this department, His Excellency appointed a Produce Advisory Committee, composed of the following members :—

The Honourable Director of Agriculture—*Chairman*
 „ „ Commissioner, Northern Province
 „ „ the Mercantile Member, Legislative Council
 Three Agents of Local Firms to be nominated by the Sierra Leone Chamber of Commerce
 The Inspector of Plants and Produce.

105. The three Agents nominated by the Chamber of Commerce were :—

The Agent, Messrs. United Africa Company
 „ „ „ G. B. Ollivant & Co.
 „ „ „ Compagnie Francaise de l'Afrique Occidentale.

106. The Mercantile Member, Mr. H. Blackhurst, is the Agent for Messrs. Paterson, Zochonis & Company so that the larger firms are all represented on the Committee.

107. The Advisory Committee had its first meeting on July 7, 1937 when the policy of inspection was discussed and recommendations were put forward for improving up-country inspection by increasing the number of Sub-Inspectors employed. These recommendations were forwarded to Government and have received favourable consideration. It is hoped that the necessary provision will be made in the 1939 estimates for the extra staff involved.

108. The question of bringing rice within the orbit of the Native Produce Ordinance is now under discussion. There are difficulties to be overcome in dealing with produce for the local market which do not exist where produce is only for export, but the Commercial Firms who trade in rice are most helpful and no doubt a solution will be reached which will prevent rice of an unsuitable and sometimes harmful nature being sold in the local markets.

AGRICULTURAL EDUCATION.

109. The Agricultural Academy, Mabang, an institution run by the Trustees of the S. B. Thomas Agricultural Trust, is the only institution in the Colony where agriculture is taught. Government has made use of this institution for the training, during the first two years, of Agricultural Apprentices but it has always been realised that the training which could be given at Mabang Academy would not be sufficient for the junior staff of this department. The training of Agricultural Apprentices and the teaching of biological subjects to teachers in the Education Department, who will subsequently be employed in Protectorate schools, has long been a matter of concern, and during 1937, in collaboration with the Director of Education, a scheme was devised for the training of Teachers and Agricultural Instructors at Njala. Under this scheme teachers will not only receive the normal training of their profession but will receive instruction in the biological sciences related to agriculture at Njala and will have the opportunity, during their training, of seeing improved methods of agriculture and the benefits to be gained therefrom. This scheme is being financed by a grant of £2,000 a year, beginning in 1938, from the Mining Benefits Fund, and as soon as necessary buildings are erected and the staff obtained the training can begin. From the point of view of the Agricultural Department this marks an important step forward. Not only will it now be possible to give our own future instructors a proper training but there will be an improvement in the teaching staff throughout the Protectorate and those branches of education so important for the improvement of rural conditions will no longer be neglected.

SECTION III—FINANCE.

110. The accounts of the department were throughout the year in the charge of Mr. G. A. P. Hamilton, Third Grade Clerk, and were kept in a manner reflecting great credit on so junior an officer.

111. The amount provided in the Estimates for 1937 for the carrying out of the work of the department was £17,845. Of this amount £13,795 was for Personal Emoluments and £4,050 was for "Other Charges." This provision was increased from time to time in the course of the year and by the end of the year Special Warrants amounting to £1,531 had been granted.

These Special Warrants included provision for :—

			£	s.	d.
(a) Salary for a Livestock Officer	...	...	205	0	0
(b) A Temporary clerk	...	...		5	12 0
(c) Purchase of a store at Rokupr	...	...	481	2	0
(d) Increase in wages of labourers due to increase in cost of living	...	...	650	0	0

When compared with the previous year, the provision from Government funds shows an increase of £4,553 14s. 0d. This increase in the cost of running the department is largely due to the fact that provision for the continuation of work on the development of the rice industry, financed in the previous year from the Colonial Development Fund, was provided for by Government in 1937.

112. The total actual expenditure was £17,915 7s. 10d. made up as follows :—

	£	s.	d.	£	s.	d.
Salaries	12,863	16	1			
Duty Allowance	210	0	0			
Seniority Pay	175	7	1			
Allowance in lieu of quarters	3	0	0	13,252	3	2
OTHER CHARGES.						
Labour	2,239	1	11			
Tools, appliances and materials	192	4	9			
Seeds export samples ...	273	1	1			
Uniforms for subordinate staff	74	17	1			
Stock	172	7	2			
Purchase of lorry	208	12	6			
Travelling	991	11	11			
Contingencies	30	6	3			
Purchase of rice store ...	481	2	0			
				4,663	4	8
				<u>£17,915</u>	<u>7</u>	<u>10</u>

This expenditure is actually £28 16s. 6d. less than the total expenditure in the previous year.

113. The cost of each division of the department was as follows :—

—		Salaries.	Duty Allowance.	Seniority Pay.	Allowance in lieu of Quarters.	Other Charges.	Total.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Headquarters	...	1,825 17 11	210 0 0	—	—	607 19 3	2,643 17 2
Southern Province (including Njala)	...	4,023 17 3	—	113 12 11	—	1,672 4 0	5,809 14 2
Northern Province (including Rokupr)	...	2,373 9 6	—	30 0 0	3 0 0	1,327 10 11	3,734 0 5
Colony (including Newton)	...	558 7 0	—	—	—	507 0 2	1,065 7 2
Produce Inspection	...	1,922 0 8	—	—	—	481 8 11	2,403 9 7
Research	...	2,160 3 9	—	31 14 2	—	67 1 5	2,258 19 4
Total	...	£12,863 16 1	210 0 0	175 7 1	3 0 0	4,663 4 8	17,915 7 10

114. *Rice Mill Suspense Account*.—This account shows a small profit of £54 18s. 8d. at the end of the year. The profit during the previous year was £46 19s. 1d. or £7 19s. 7d. less than the profit in 1937. The two reasons why the profit was so small in 1937 are :—

- (i) a low rate of milling was charged to popularise the new process, and
- (ii) the extremely high cost of electric power. (This latter cost is being reduced in future).

Receipts.

	£	s.	d.	£	s.	d.
Sale of rice	350	13	2			
Sale of bags	15	14	6			
Milling receipts	509	18	1			
Sundry credits outstanding on 31st December, 1937	64	7	0			
Stock in hand	111	5	0			
				1,051	17	9

Expenditure.

Stock in hand in December 31, 1936	24	0	0			
Rice purchases	258	3	5			
Bag purchases	105	0	0			
Wages to Millhands and labour	285	17	8			
Overtime to Millhands and labour	18	7	3			
Tools, appliances, materials ...	29	18	0			
Oils, grease, etc.	6	19	11			
Transport	11	3	2			
Electric Light and Power	257	9	8			
				996	19	1
Profit				£54	18	8

115. *Rice Suspense Account, Agricultural Department*.—Owing to a local shortage of rice the Secretary of State, on the recommendation of His Excellency the Governor, approved of the opening of an account for the purchase of rice for resale to the staff at Njala. £115 8s. 4d. was spent in the purchase of rice. The intention being to relieve the local shortage, the rice was sold at a price barely to cover the cost. The transaction however yielded a small profit of £4 13s. 7d.

116. *Prisons Unallocated Stores Suspense Account (General Suspense Account)*.—To help to meet the shortage of rice during the year, the Secretary of State approved of the importation by Government

of rice to be liberated at such times and in such quantities as would best help the situation. £2,200 was spent on the purchase of Milchar rice, £200 worth was used by the Prisons Department and paid for directly from the Prisons diet vote and the remainder was sold. The account showed a profit of £251 0s. 4d. at the close of the year and this was credited to Revenue.

117. *Beeswax Suspense Account*.—The total amount realised from the sale of beeswax during the year amounted to £174 19s. 7d. Of this amount, £164 5s. 7d. was not received from the purchasers in time to be paid into Treasury by the close of the year. The following is a summary of the account at the close of the year :—

	£	s.	d.	£	s.	d.
Cash sales—January to						
December	10	14	0			
Late payments for wax sold	164	5	7			
Stock in hand—December 31,						
1937	21	1	9			
				196	1	4
Less expenditure—						
Purchase and clarification of wax				179	0	10
Profit ...				£17	0	6

118. *Revenue*.—The revenue of the department for the year amounted to £2,361 8s. 5d. which is an increase of £572 16s. 7d. on the previous year. With the exception of "Receipts—Newton Fruit Farm" and "Departmental Fines" it represents an all round increase as will be seen from the following comparative statement :—

COMPARATIVE STATEMENT OF REVENUE.

	1937.		1936.		Increase.		Decrease.	
	£	s. d.	£	s. d.	£	s. d.	£	s. d.
Produce Licences	1,583	3 0	1,323	15 0	259	8 0	—	—
Fines for Contravention of Native Produce Ordinance	210	15 0	169	19 6	40	15 6	—	—
Departmental Fines	0	17 4	3	3 1	—	—	2	5 9
Receipts—Newton Fruit Farm	16	10 7	33	13 11	—	—	17	3 4
Sales—Produce	214	11 10	126	5 0	88	6 10	—	—
Sales—Old stores	7	17 7	6	1 5	1	16 2	—	—
<i>Profits.</i>								
Rice Mill Suspense Account	54	18 8	46	19 1	7	19 7	—	—
Beeswax Suspense Account	17	0 6	78	14 10	—	—	61	14 4
Rice Suspense Account—Agricultural Department	4	13 7	—	—	4	13 7	—	—
Prisons Unallocated Stores Suspense Account (General Suspense Account)	251	0 4	—	—	251	0 4	—	—
	£2,361	8 5	1,788	11 10	654	0 0	81	3 5

	£	s. d.
Total increase	...	...
Total decrease	...	...
Net increase	...	...
	£572	16 7

119. The revenue of the department has steadily increased during the past five years :—

Year.	Revenue Collected.			Increase on previous year.		
	£	s.	d.	£	s.	d.
1933 ...	1,313	15	7	—		
1934 ...	1,336	4	10	22	9	3
1935 ...	1,386	17	3	50	12	5
1936 ...	1,788	11	10	401	14	7
1937 ...	2,361	8	5	572	16	7
Increase in five years				<u>£1,047 12 10</u>		

SECTION IV—LEGISLATIVE CHANGES.

120. The following legislation dealing with Agricultural matters was enacted during 1937 :—

- (i) RULES NO. 8 OF 1937—*Native Produce (Amendment) Rules, 1937.*—The Rules under the Native Produce Ordinance, 1928 were amended in certain particulars to include “Rice.”
- (ii) ORDER IN COUNCIL NO. 1 OF 1937—*Rice Export Prohibition Order in Council, 1937.*—By this Order in Council the exportation of rice from the Colony and Protectorate was prohibited except by licences issued by the Director of Agriculture.
- (iii) ORDER IN COUNCIL NO. 2 OF 1937—*Control of Rice Order in Council, 1937.*—By this Order in Council rice was deemed to be a control article under the Foodstuffs (Control and Prevention of Exploitation) Ordinance, 1932.
- (iv) ORDER IN COUNCIL NO. 5 OF 1937—*Plant Pests (Import) Order in Council, 1937.*—This Order controls the importation of planting material into Sierra Leone.
- (v) ORDER IN COUNCIL NO. 6 OF 1937—*Control of Rice (Amendment) Order in Council, 1937.*—This Order fixed the maximum price for which rice could be sold in Sierra Leone.
- (vi) ORDER IN COUNCIL NO. 11 OF 1937—*Control of Rice (Amendment) (No. 2) Order in Council, 1937.*—This Order fixed the maximum price for which rice could be sold in the Pujehun District.
- (vii) ORDER IN COUNCIL NO. 16 OF 1937—*Control of Rice (Amendment) (No. 3) Order in Council, 1937.*—This Order fixed the maximum price at which imported rice could be sold in certain areas and revoked Clause 3 of the Control of Rice Order in Council, 1937.

CONCLUSION.

121. The year 1937 from the departmental point of view was one of considerable interest. The success of the past four years work in the Scarcies area has been very gratifying and experience and information once gained in the Scarcies was immediately applied in other areas, notably the Moyamba District of the Southern Province and the eastern part of the Colony Peninsula. In these two latter areas great developments can be looked for in the near future. This success of the Scarcies Rice Farm and the immediate application in other parts of Sierra Leone was only obtained by the closest co-operation not only of the Agricultural Officers concerned but also of the Administrative Officers in whose districts Agricultural Officers were working. I wish to place on record my appreciation of the efforts of all officers to carry on the work of the department, when numbers were temporarily reduced by illness, and in circumstances often very arduous and trying. Among the latter the mud swamps of Sierra Leone during the prolonged rainy season take a high place and all officers have uncomplainingly taken their turn.

F. J. MARTIN,
Director of Agriculture.

APPENDIX I.

ROKUPR EXPERIMENTAL RICE STATION

by

Agricultural Officer, Northern Province.

Mr. G. M. Roddan was in charge until Mr. R. R. Glanville returned from leave on August 16th. Mr. A. F. MacKenzie assisted from January 1st to April 18th and Mr. E. S. Garner from June 14th to July 4th.

General work carried out during the year included further improvement of the residential area, and the clearing of a non-tidal swamp valley to be used for rice nurseries and upland crops. The cement drying and threshing floor was extended. Water tanks were erected at No. 1 Bungalow.

A large store situated on the town wharf was purchased, and is being used for the storage of seed rice for distribution to farmers.

A launch was obtained for river work on October 15th and in this connection had covered 1,088 miles before the end of the year.

The area set aside for garden and other annual upland crops was extended, and planting material of many kinds was distributed to local farmers. Planting material most in demand included yams, coffee, oil-palm, Canary banana and Kono ground-nuts. Canary bananas planted in May on raised beds on the fringe of the swamp did very well and were bearing in December. Yields from the yam plots were as follows :—

Yellow—7,471 lb.; Jaffna—10,208 lb.; Chinese—26,556 lb. per acre. Kono ground-nuts planted in May and harvested in September, gave a yield of 1,644 lb. per acre; and when replanted in low lying rice

nursery land in September gave a yield of 1,116 lb. when harvested in January. Three varieties of Japanese chillies obtained from Kew were very successful and should be much appreciated by farmers and market gardeners.

Three oxen were purchased for ploughing on the farm. They have been very satisfactory and have kept good health without any special feeding. A steading was built for them.

A start was also made with Rhode Island Red poultry, one cock and six pullets being obtained in April. Two pullets died but the remainder kept good health and 269 eggs were laid. Twenty-one chicks were hatched from four sittings of twenty-eight eggs. One hundred and fifty-eight eggs were purchased by local farmers most of whom had good hatches, although the subsequent mortality, chiefly by violent death (from hawks) was rather high.

Work with rice was continued along the lines of that of previous years, namely—the improvement of local varieties by pure line selection; the introduction and trial of new varieties from other countries; the multiplication and distribution to farmers of varieties which have proved to be better than the local varieties; the investigation of cultural methods; and the character study of varieties of importance. In connection with the latter Mr. Roddan compiled a useful key based on grain characteristics.

Weather conditions were favourable for the rice crop and production was slightly higher than in 1936.

NURSERIES.

The fertility of the rice nurseries has been largely maintained by growing leguminous crops, chiefly cowpeas, *pueraria*, *centrosema*, and sunn hemp, after the rice has been transplanted. Cultivation consisted of ploughing in the dry season and harrowing prior to sowing. Some plots, particularly those with light soils, also received applications of ashes and decomposed organic matter. So far no difficulty has been experienced in maintaining fertility, but soil wash tends to be severe on plots which are even slightly sloping and it appears essential to level and bund all plots which are required for annual nursery work. This system will be tried in part of the nursery area in 1938.

The growth of the rice in the nurseries was on the whole better than in 1936. Although *Piricularia*, and, to a lesser extent, *Helminthosporium* were present on nearly all varieties, the only serious damage was caused by *Piricularia* on late sown varieties, chiefly those introduced from Madras and Burma.

FARM.

In previous years the farm blocks were prepared by deep hoeing during the early part of the dry season. This year a Ransome's 'Victory' plough, drawn by two oxen, was used. The actual ploughing was well done. Although occasional deep cultivation may be beneficial in promoting the decomposition of organic matter, it appears probable that in tidal swamps deep annual cultivation is not necessary and may possibly be harmful. Experiments to determine how and when digging should be done are now being started.

Probably as a result of too much cultivation and over drainage, chlorosis was much more pronounced than in any previous year. The varieties Kavunginpoothala and D.C. pa lil suffered most. Chlorosis was most severe during the first two months after planting but subsequently practically disappeared.

Even those varieties most affected by *Piricularia* in the nursery recovered when planted out on the farm. *Helminthosporium* was very severe on the block of Kavunginpoothala, where soil conditions were unsatisfactory, and it was necessary to destroy the crop.

Crabs continued to be plentiful, but damage was largely restricted to the areas adjoining the bunds. Adequate guard rows were planted around all experimental plots.

INTRODUCTIONS OF NEW VARIETIES.

Three new varieties which were reputed to be resistant to *Piricularia* were introduced from Madras. They were Co. 4, No. 10,998, No. 11,340. The last two are crosses between G.E.B. 24 and Korangu Samba. No. 10,998 was severely attacked by *Piricularia* in the nursery and none of them did well either in the nursery or on the farm. They were however received late and were sown and planted out of season. They will be given a further trial in 1938.

The four Burma rices, Ngasein, Sughandi, Midon and Emata, which were received late in 1936, were tried again under normal conditions. All are promising, Ngasein particularly so. Ngasein gave a yield of 3,816 lb. per acre which is the highest yield so far recorded at Rokupr. In 1938 they will be submitted to a comparative yield trial with the local Toma as control.

PURE-LINE SELECTIONS.

Pure-line selection was continued by the methods described in detail in the Annual Report for 1935.

First Year.—The varieties G.E.B. 24 and Co. 7 which are now established in the Scarcies, were submitted to the first stage, single plant selections, with a view to maintaining purity. Selections were also made from Mo-kuk, a salt-resistant variety introduced from Hong Kong in 1936. This variety is of short duration and may be very suitable for saline areas. At present, however, it is very mixed genetically, many ears having awned and red grain. It is hoped to remedy this by selection.

Second Year.—Twenty-two single plant selections of Lal, a strong strawed local rice, much in demand for growing in flooded grass lands, were submitted to the usual tests for purity. The general standard was very high and seven very promising strains were retained for comparative yield trials.

Third Year.—Selected strains of three local varieties, Bis, India and Bolo were submitted to comparative yield trials with the following

results. The control in each case was the farmers' bulked seed from which the original selections had been made:—

I. Variety.—BIS.

Three strains and control.

Lay-out.—Latin square 4 x 4. Plot size 18' x 18' planted singly at 6" x 6".

Strain.		Yield per acre, lb.	Yield as per cent. of Control.
101	...	2,381	112
112	...	2,254	106
107	...	2,230	105
C	...	2,118	100

Statistical Note.—A difference of 153 lb. is significant when $P=0.05$ and 231 lb. when $P=0.01$.

Strain 101 is significantly better than the control but there is no significant difference between Strains 112 and 107 and the control.

II. Variety.—INDIA.

Six strains and control.

Lay-out.—Latin square 7 x 7. Plot size 8' x 8' planted singly at 6" x 6".

Strain.		Yield per acre, lb.	Yield as per cent. of Control.
37	...	2,675	100.2
C	...	2,669	100.2
28	...	2,480	92.9
25	...	2,383	89.3
36	...	2,273	86.1
2	...	2,213	82.9
24	...	1,903	71.4

Statistical Note.—A difference of 480 lb. is significant when $P=0.01$ and 358 lb. when $P=0.05$.

Strains 36, 2 and 24 are significantly less than the control, $P=0.05$.

III. Variety.—BOLO.

Six strains were compared but the experiment was not statistically significant.

Fourth Year.—The following selected strains of local varieties were grown for further observation and multiplication:—D.C. pa lil 96; Toma 54, 55; D.C. 5, 39, 42; Fodea 142, 143, 151.

All did well and appear fixed in type. None of these strains have given yields significantly greater or less than the unselected farmers' seed, but they are all a definite improvement in quality being white grained and uniform in ripening.

GENERAL MULTIPLICATION AND MAINTENANCE.

The three varieties at present most in demand by the local farmers are G.E.B. 24, Kavunginpoothala, and Co. 7, and good quantities of each of these were grown to maintain an adequate supply of pure seed for distribution.

In all, thirty-three varieties and 46 strains were grown during the year. The following list shows the more important varieties grown on the farm and the seed now available.

Variety.	Type.	Origin.	Seed in lb.
Bali	Salt resistant	Madras, 1931	326
Mo-kuk	"	Hong Kong, 1936	312
Kavunginpoothala	Deep-water	Madras, 1931	3,082
No. 79	Medium duration	B. Guiana, 1934	345
Lead	"	"	310
D.C.	"	"	686
G.E.B. 24	"	Madras, 1931	3,914
Co. 7	Long duration	"	4,448
Co. 5	"	"	1,066
Midon	"	Burma, 1936	78
Emata	"	"	201
Sughandi	"	"	156
Ngasein	"	"	217
D.C. 39	Medium duration	Local selection	140
Fodea 142... ..	Long duration	"	620
Toma 55	"	"	918
D.C. pa lil 96	"	"	120
Miscellaneous	Misc.	Misc.	2,255
Total			<u>19,214</u>

REVOLVING SEED SCHEME.

This scheme, which provides for the loan of pure seed to Scarces farmers, was begun in 1935 when 90 bushels of G.E.B. 24 were distributed. In the year under review 1,664 bushels were loaned to 506 farmers. This quantity included 1,516 bushels of G.E.B. 24, 52 of Co. 7 and 27 of Kavunginpoothala. Farmers receiving seed on loan are required to rogue that part of the farm from which seed is obtained, and to return the amount received plus twenty-five per cent. This scheme has met with great success and has done much to improve the quality of the Scarces crop. It is hoped to maintain purity by the annual substitution of a certain quantity of seed from the experimental farm.

R. R. GLANVILLE,
Agricultural Officer, Northern Province.

APPENDIX II.

NJALA AGRICULTURAL STATION

by

Agricultural Officer, Southern Province.

Mr. J. W. D. Fisher was in charge until July when he proceeded to Freetown for duty at headquarters, and in August went on leave. Mr. E. I. Nisbett was then alone in charge of the station until joined by Mr. G. M. Roddan in September and by Mr. A. F. MacKenzie for part-time duty in October.

Investigations on upland farm crops have progressed satisfactorily in spite of the fact that only one officer was available for the Southern Province and this station for the greater part of the year.

New buildings erected during the year included a European Rest-house and two African staff quarters.

FERTILITY EXPERIMENTS WITH PIGEON PEAS.

This experiment, started in 1936, occupies two acres in one of which the bush was stumped and in the other the stumps were left as in a native farm. The object is to see if fertility can be maintained by growing pigeon pea and, if so, for how many years it is necessary to grow pigeon pea before taking a crop of rice. Pigeon pea is being grown on sections for periods ranging from one to four years before all sections come under a crop of rice in 1940. The lay-out is a randomised block with the four variants replicated ten times.

FERTILITY EXPERIMENT WITH CENTROSEMA.

Centrosema pubescens was sown on two acres and a good cover established. Sheep graze on the crop readily. In 1938 a folding trial will be carried out on the two plots.

GREEN MANURE VARIETIES.

A trial designed to test the relative values of seven leguminous crops was carried out on one acre. The variants were *Stizolobium atterimum*, *Canavalia ensiformis*, *Pueraria phaseoloides*, *Calopogonium muconoides*, *Centrosema plumierii*, *Tephrosia candida* and pigeon pea. Successful covers were obtained in every case. The crops were turned into the soil and rice, the test crop, will be grown on all sections of the plot in 1938.

RICE.

Pure-Line Selection of Upland Varieties.—A start was made with the pure-line selection of three popular local upland varieties, namely:—Boguti, Jete and Upland D.C. The bulk sample of each variety was hand-picked for obvious rogues. Seed was sown in drills one foot apart. A control plot of each variety was sown. Selection plots were thinned to about six inches between plants. It is proposed to retain about twenty of the selections of each variety for trial as families in 1938 when further selection will be by general observation and yield.

Wet-land Rice.—One acre of swamp was rented from a local farmer and planted with G.E.B. 24 rice for general observations on its behaviour and for seed multiplication. It was necessary to construct a bund to control the flow of water through the swamp which became too rapid in the month of August. The rather low yield of 1,175 lb. to the acre was recorded.

The upper part of the Bonjema swamp within the farm lands was also planted with G.E.B. 24 rice following sweet potatoes grown on large mounds in which had been buried considerable quantities of grass and swamp vegetation. The soil in this swamp is not in good condition for rice and an effort is being made to improve it. The flood waters of the Taia River were, however, too much for the crop, and water-control measures must be undertaken in future work.

GROUND-NUTS.

A comparative yield trial was devised to show the effect of date of planting and the incidence of virus disease on the yield.

The lay-out was randomised blocks of six variants replicated seven times. Each plot was 24' by 20'. The ground-nuts were planted at 12" by 12" with two nuts per stand.

The results are tabulated :—

Date of Planting.	Mean yield/plot ozs.	Mean per cent. infection on 28th Oct., 1937.	Mean per cent. of stands at 14th June, 1937.	Mean yield/ plant.
3-4-37 ...	136	44.7	38.04	0.68 ozs.
13-4-37 ...	131.7	46.4	65.8	0.38 "
23-4-37 ...	131.4	21.1	71.4	0.35 "
3-5-37 ...	124.6	29.5	96.7	0.24 "
14-5-37 ...	112.3	26.7	91.2	0.23 "
24-5-37 ...	102.4	26.3	90.6	0.22 "

A statistical analysis of variance gives the following results :—

	DF.	SS.	M/S.	Z.
Blocks ...	6	6835		
Treatments ...	6	5360.14	31.99	$\log_e 0.0324$
Error ...	30	30176.5	31.70	
Total ...	41	42371.64		

Standard error as per cent. of General Mean = 25.75 per cent. As the calculated value of Z at five per cent. point for requisite degrees of freedom for $\log_e$ is 0.4648 and the observed value for $\log_e$ is 0.0324, the variance due to treatments is insignificant.

It will be noted in the table that the percentage infection is greater in the early plants than in the late, and that the percentage of plants surviving in the plot is very much lower. The date of the first infections seen was June 10th, and the surviving plants were then counted. The small number of stands left in the early plantings was due mainly to drought and poor germination.

The first appearance of the virus disease was noted in five isolated parts of the plot, and from a plan kept of the position of the virus diseased plants it is fairly evident that the virus probably spread out from these points.

The mean yield per plant for the various dates of plantings is interesting as although the early plantings have a greater percentage of virused plants the mean yield is greater. There is, however, a negative correlation co-efficient of -0.9838 between the mean yield per plant and the percentage stand. This correlation co-efficient is highly significant, and it indicates that probably the spacing of the plants affected their yields to a greater degree than the other factors.

The conclusions drawn from these results are :—

- (a) Early planting has not reduced the incidence of virus, but rather has shown some increase.
- (b) That the yield has not been raised to any significant extent by early or late planting.
- (c) There is an indication that wider spacing gives sufficiently greater yield per plant to compensate for a decrease in plant numbers.

OIL-PALMS.

Work on the six native and introduced kinds has continued on the usual lines in collaboration with the Plant Pathologist. The Plant Pathologist's report on these and the yield data are to be found in Appendix VI.

No seed from self-pollinated Angola palms was available for sowing, but seed of high-yielding Deli palms has been sown and some palms will be ready for distribution in 1938.

COFFEE.

The kinds undergoing trial are :—

- (a) Robusta under natural shade.
- (b) Robusta under *Cassia siamea* with *Gliricidia maculata* interplanted for lopping.
- (c) Stenophylla under natural shade.
- (d) Excelsa under natural shade.

Individual tree yields are recorded.

CITRUS.

A heavy crop of grapefruit was harvested from Marsh, Foster, Thompson and McCarty trees in Plot 15. The total number of fruits harvested being approximately 62,000 as against some 6,000 fruits in the previous year. Eighteen per cent. of the fruits showed scab lesions, twelve per cent. being badly blemished. A further series of spraying trials was carried out in collaboration with the Plant Pathologist.

A small canning plant has been obtained for trial purposes.

PINE-APPLES.

Material of Smooth Cayenne, Queen, Red Spanish, Baronne de Rothschild and an unnamed kind is being propagated for field trial in 1938. The disc method of propagation has been used with moderately successful results except in the case of Smooth Cayenne which is difficult to propagate.

BLACK PEPPER.

The vines planted with live "plum" stakes as support have not thrived. A more suitable shade must be found for this crop.

CINNAMON.

Considerable losses occurred among the young plants. This crop would appear to be somewhat difficult to start here.

KOLA.

Several replacements were made in the plot under natural shade. The kola plant requires a good deal of care in the early stages.

CHILLIES.

Small plots of the following varieties were planted for multiplication of seed:—Japanese Birds-eye, Hontaka, Portuguese West African, Tuticorin and Swef Jap.

LIVESTOCK.

Poultry.—The breeding pens of Rhode Island Red fowls have been maintained. Orders for fowls and hatching eggs were much greater than could be met and the breeding stock is to be increased at an early date. Egg-lying records were kept throughout the year and breeding will in future be with selected hens only. Strict culling has been carried out in the young stock. The main difficulty experienced in raising a healthy stock of birds has again been internal parasites. Hawks and ants have been troublesome pests.

NURSERY.

The nursery is still without a proper water supply, in consequence of which heavy costs were incurred in watering inefficiently by hand during the first four months of the year.

A good stock of budded grapefruit, oranges and lemons has been prepared for distribution in 1938.

The nursery was extended with further sections for economic and ornamental plants. One thousand and twenty-six sour orange stocks were planted out for budding in 1938.

A list of the principal plant and seed introductions is to be found in Appendix IX.

In Appendixes VIII and VIIIA are to be found lists of planting material of economic and ornamental plants distributed from Njala.

J. W. D. FISHER,
Agricultural Officer, Southern Province.

APPENDIX III.

PRODUCE INSPECTION.

<i>Palm Kernels.</i> —Railments	...	...	36,694 tons
Exports	...	...	76,776 „

The trade in palm kernels for the first half of the year for this product was satisfactory. The price opened at Freetown in January at £11 10s. 0d. per ton and gradually fell month by month until in June it had fallen to £7 10s. 0d. a ton. Railments for this period returned an increase when compared with a similar period during 1936, of 2,210 tons.

During the second half of the year prices fell steadily from £7 15s. 0d. per ton in July to £6 12s. 6d. in December, and railments and exports both correspondingly decreased when compared with a similar period during 1936. The railments and exports declined to the extent of 7,490 tons and 5,668 tons, respectively.

From the following summary of exports taken during the past five years, it is of interest to note that the exported tonnage for 1937 exceeds the average for the five year period ending 1937.

Exports of palm kernels	1933	...	64,084 tons
	1934	...	68,655 „
	1935	...	78,019 „
	1936	...	84,578 „
	1937	...	76,776 „
Average	...		74,422 tons

Inspection throughout the year has been consistently maintained, and it is again a pleasure to record that the co-operation and assistance given by the principal shippers has materially assisted in bringing about the present satisfactory conditions.

Palm Oil.—

	1936.	1937.		
Railments ...	1,527 tons	1,785 tons	Increase	258 tons
Exports ...	1,222 „	2,325 „	„	1,103 „

Purity of this product from all parts of the country remains surprisingly high. Though frequent examinations are carried out by Inspectors both at up-country buying centres and the chief ports of export, no cases either of adulteration, or excessive impurities, were detected.

Ginger.—Compared with 1936, railments and exports both return a substantial increase. They are as follows :—

	1936.	1937.		
Railments ...	1,691 tons	2,553 tons	Increase	862 tons
Exports ...	1,642 „	2,384 „	„	742 „

Propaganda amongst cultivators previously described in the 1936 Annual Report, was again actively pursued during the season of 1937. Results were most satisfactory to both farmers and dealers alike, the latter perhaps being the most appreciative owing to the substantial decrease in loss of weight due to better drying of the ginger.

Piassava.—

		1936.	1937.	
Exports	...	3,558 tons	3,392 tons	Decrease 166 tons.

Buying prices at Sherbro throughout the year were consistent, and with the exception of those offered during December varied from £18 to £22 a ton.

While the amount of fibre produced in the Sherbro District has increased somewhat, that in the areas supplying the Sulima market has decreased. In the latter area producers have very definitely increased their output and although tonnage exported from Sulima was slightly less, an exceptionally heavy quantity was left on hand at the end of December.

The methods of instructional propaganda have already been explained in previous Annual Reports; they are still pursued in both the areas supplying the markets of Bonthe and Sulima. In the Sulima area an Instructor, has, during the year, been given authority to act as "Inspector" of piassava; this has been done in order to stop certain dealers from buying (and thereby encouraging the preparation of) imperfectly retted material in the many places beyond the reach of the Sub-Inspector of Plants and Produce stationed at Sulima.

Though prices offered at Sulima are much below those offered at Sherbro, producers are nevertheless paid in accordance with the quality they offer. Well prepared piassava is purchased at a definite premium on the ordinary fibre, the actual amount paid varying with the ruling market prices. Unfortunately the willingness of traders to buy and then recondition encourages producers to prepare their fibre in a slovenly manner. Naturally dealers pay a correspondingly lower price for produce but the native producer is generally so much in a hurry for his money that he is prepared to take the lower price rather than spend time and energy on cleaning. This is one of the difficulties which propaganda has to contend with in that particular area; nevertheless, progress is being made, and during 1937 "Sulima" piassava was sold in markets abroad, which hitherto had refused to handle it. This emphasises the improvement brought about in preparation through the medium of propaganda.

Beeswax.—In 1937, 41½ cwt. of beeswax was purchased by the department, and, after clarification shipped to England where again the good appearance was commented upon. Though the industry may never attain large proportions, there is no reason why it should not be increased. A process of clarification has been devised which is far less complicated than the native method of extracting pericarp oil from palm fruits, and one, which, by its complete simplicity, can be carried out amongst any native community. There is no difficulty in marketing the finished product.

Staff.—The Inspector of Plants and Produce returned from vacation leave on February 20th, 1937.

The staff of Sub-Inspectors was increased at the beginning of the year by the addition of two appointments, and on the instructional side, by the addition of one Instructor for work in piassava producing areas.

Prosecutions.—The number of persons reported for infringement of the Native Produce Ordinance amounted to 149 ; of these 147 were convicted, two remaining to be dealt with at the end of the year.

Weights and Measures.—The verification of weights and measures was carried out by the Inspector of Plants and Produce and 516 certificates of justness were issued. Fifteen persons were reported and convicted for infringement of the Weights and Measures Ordinance.

General.—It is satisfactory to record that another year has passed during which there have been no complaints from any of the principal shippers in regard to the purity of prescribed produce exported from Sierra Leone. This satisfactory state is largely due to the strict vigilance and inspection in the buying centres up-country of Sub-Inspectors of Produce. Every effort is made to examine produce before it is moved to the Ports.

In conformity with the views put forward by Sir Frank Stockdale on his last visit to Sierra Leone, an Advisory Committee has been formed, consisting of officers of the Administrative and Agricultural Departments and the leading members from the Commercial community. The object of the Committee is to investigate means of facilitating the work of inspection and to recommend to Government the steps which should be taken to improve the general standard of produce. Though in the past produce inspection has worked in harmony with commercial enterprise, there is no doubt that the formation of this Committee will do much to bring before Government the point of view of the commercial community and prevent misunderstandings in the future.

F. W. B-ALLINSON,

Inspector of Plants and Produce.

APPENDIX IV.

ENTOMOLOGICAL WORK.

The Entomologist, Mr. E. Hargreaves, proceeded on leave on January 28th, and retired from the service on medical grounds on the 12th December. The work of this section, which has been greatly hampered by the absence of the Entomologist throughout the year was continued by the Entomological Assistant, Mr. J. S. Wellington. Assistance was given by Mr. F. C. Deighton, the Plant Pathologist.

Citrus—Fruit-piercing Lepidoptera.—These appeared earlier than usual, but citrus fruits were not affected to any appreciable extent until towards the end of May when Mango and Cashew fruits had become scarce. In 1936 the intermediate crop at Njala was small, and, partly for the convenience of spraying operations at flowering time, all fruits were removed from the trees by the end of March, whereas in 1937 the intermediate crop was much larger and was not completely harvested till September, and many pierced windfalls were recorded, especially in May and June.

The total citrus windfalls recorded at Njala for the year was 16,913 of which 13,828 were pierced, as against 3,358 of which 88 were pierced, for 1936. Pierced fruits in May alone amounted to 13,212.

When practicable, the usual control measures—catching at night with the aid of light and butterfly nets, and the use of poisoned baits—were carried out and they accounted for the destruction of some 800 moths, representatives of about 30 species of fruit piercers.

New food plant records are (a) adult moths, *Cyligramma* sp., *Erebus walkeri* and *Mocis undata* on breadfruit; and (b) larvæ, *Achaea trapezoides* and *Anua tirhaca* on *Combretum comosum*, *Anomis* sp. on *Hibiscus esculentus*, *Cyligramma* sp. on *Acacia pennata*.

Rice.—"Shield bugs" (*Aethemenea chloria*, Wstw.) which together with "Army-worms" (*Laphygma eximpta*, Wlk.) did a good deal of damage to the 1936 rice crop, again appeared, but only in small numbers, towards the end of June. Damage by them has been negligible. Adult bugs brought into the laboratory for observation purposes on June 26th gave rise to five successive generations by the end of November. Eggs laid on December 12th by the 5th generation failed to hatch by December 31st (up to the end of November the mean incubation period was five days). In spite of the presence of suitable food, adults, towards the end of the year, became very lethargic in addition to undergoing a change of colour from the usual bright green to something brownish. Contrary to what obtained in 1936, no stage of the insect was observed on its wild host, the grass *Rottboellia exaltata*.

Coffee.—This crop was again attacked by the Lycaenid borer, the larvæ of which feed on the berries. The control measures recommended by Mr. Hargreaves in 1936, viz. hand-picking and burning of damaged berries, and the removal of the wild host of the insect (the bush *Heinsia pulchella*) from the vicinity of coffee plantations, were carried out at Njala and they appear to have been effective. Coffee trees were also attacked by stem borers and termites towards the end of the year, but these were effectively dealt with by applying a lead arsenate-calcium oxide "paint" to the stems of the affected trees.

Locusts (*Locusta migratoria*, L.).—There was a fairly heavy invasion of these during the year. Sixty-six reports of swarms were received and hoppers were bred in the country. Kono District was the scene of the hopper outbreaks in the Southern Province, and in the Northern Province, Port Loko and Karene Districts. Due to shortage of staff, however, it was not possible to conduct an extensive hopper destruction campaign, but nineteen hordes were destroyed in Kono through the efforts of the District Commissioner in co-operation with this department. In the Port Loko and Karene Districts where the hoppers appeared during the planting season, many rice and fundi farms were reported to have been damaged or destroyed. In some areas in the Port Loko District, planting of grain crops was postponed for a short time. The usual monthly reports to the Imperial Institute of Entomology were submitted.

Publications.—Two papers by Mr. Hargreaves—"Fruit Piercing Lepidoptera in Sierra Leone" and "Some Insects and their food plants in Sierra Leone" were published in 1937.

J. S. WELLINGTON,
Entomological Assistant.

MYCOLOGICAL WORK.

The Plant Pathologist was seconded to the Gold Coast from the end of May till the end of October.

Citrus.—Further inspection, in 1937, of citrus plants throughout the country revealed scab (*Sphaceloma fawcettii*) only in very few places. The few severely diseased trees seen were destroyed and more lightly infected trees were pruned.

Pink Disease (*Corticium salmonicolor*) was recorded on citrus for the first time in Sierra Leone in December when a large seedling grapefruit at Jaiama was found attacked. The fungus must have spread over the branches with great rapidity as the tree was known to have been healthy eighteen months before. Pink Disease was also found on cacao at Segbwema.

A case of foot-rot of a tangerine tree at Benguema was associated with *Nectria flavolanata* Berk. & Br.

Depressed circular radially cracked corky lesions, below which lies a cone of corky pale brown tissue extending through to the rind were occasionally found on grapefruits at Njala in the November-December harvest. The lesions were similar to those previously recorded on sweet orange and lime fruits, but larger (up to $\frac{1}{2}$ inch across). The cause is unknown and the number of fruits affected is not large enough for the trouble to be considered of importance.

A disease of unknown cause, in some ways resembling leprosis though apparently not identical, has been seen on some grapefruit trees in and near Freetown and at Moyamba. The disease appears on the young twigs as raised circular spots up to about $\frac{1}{4}$ inch in diameter and of a light biscuit colour with a well defined margin. They often occur only or chiefly at the base of the leaf stalk, where they may show cracking. The spots may coalesce when numerous, but die-back has not been observed. Lesions are not normally present on the leaves, but rarely a few pale brown spots of which the centres drop out may be found. The disease in Freetown was associated with a *Colletotrichum* but this is probably only secondary; the only fungus found on the Moyamba specimens was a *Pestalozzia*. The symptoms have only been seen so far on grapefruit. The trees attacked were otherwise quite healthy and, in fact, quite as strong or stronger in growth than neighbouring trees. The trouble appears to be of no economic importance.

Tobacco.—Leaf Curl Disease was recorded on *Nicotiana tabacum* at Segbwema, Bunumbu and Taiama. It seems probable that the disease is widespread in Sierra Leone, as leaf enations of a similar type were recorded on the following wild plants: *Stachytarpheta jamaicensis*, *Sida carpinifolia*, *S. cordifolia*, *S. veronicifolia*, *Acanthospermum hispidum*, *Ageratum conyzoides*, *Synedrella nodiflora*, and *Scoparia dulcis*. At Njala, similar symptoms were seen on Malayan varieties of Beni (*Sesamum*) and on okra. The most regularly affected wild host plant seems to vary from one locality to another, but *Stachytarpheta* showed the symptoms most generally during the dry season of 1937-8.

MISCELLANEOUS DISEASES.—*Plasmopara viticola* was recorded on a wild host, *Cissus cæsis*, at Regent.

Cultures of *Myrothecium roridum* from Sierra Leone collections on leaves of *Dolichos lablab* and *Hibiscus esculentus* were sent by the Imperial Mycological Institute to Mr. N. C. Preston who found them both strongly pathogenic to cultivated violas. A culture of a similar fungus from *Trichosanthes* was not pathogenic to violas. *Myrothecium roridum* has been recorded on several host plants in Sierra Leone but is most common at Njala in association with a leaf spot of a common wild violaceous bush, *Rinorea liberica*.

The following new host plants of *Rhizoctonia solani* were recorded at Njala: *Corchorus capsularis* and *C. olitorius*, *Kopsia arborea* and a species of *Vigna*.

New host records of *Sclerotium 'rolfsii'* at Njala, were *Thunbergia mysorensis* and *Chlorophytum elatum*.

New host records of *Macrophomina phaseoli*, at Njala, were: *Tagetes erecta* (African marigold), *Cosmos sulphureus* and *Zinnia*. Pycnidia were also collected on leaves of *Hymenocallis* ? *ovata*.

MOSAIC DISEASES (probably virus).—New records were on: *Melochia melissifolia*, water yam (*D. alata*), *Cassia occidentalis*, *Cosmos sulphureus*, *Vigna venulosa* and other *Vigna* spp., and *Commelina* sp.

The following identifications of fungi not previously recorded in Sierra Leone have been received from the Imperial Mycological Institute: *Aecidium acanthinum* Har. & Pat., on *Phayloopsis parviflora* and *P. falci-sepala*; *Aecidium aroideum* Cooke, on *Stylochiton* sp. nov.; *Aecidium* sp. near *A. baumanianum* P. Henn., on *Vangueriopsis discolor*; *Aecidium busseanum* P. Henn., on *Canthium venosissimum*; *Cicinnobolus cesatii* de Bray, on *Oidium* sp., *Dicocum* sp., possibly *D. cupaniæ* Syd., on *Anisophyllea laurina*, *Funtumia africana* and an unidentified host; *Hysterostomella tetracerae* (Rud) v. Hoehn., on *Tetracera potatoria* and *T. alnifolia*; *Puccinia cyperi-tagetiformis* (p. Henn) Kernvar. *africana* Doidge, on *Cyperus baikiei*, *C. distans*, *C. rotundus*, *C. sphacelatus*, *C. zollingeri*, and *Mariscus umbellatus*; *Puccinia fragosoana* Beltran, uredo stage, on *Imperata cylindrica* var. *koeningii* (the previous record of *P. rufipes* in this host is probably the same rust); *Puccinia lateritia* Berk. & Curt., on two new hosts, *Diodia scandens* and *Olden-landia herbacea*; *Ravenelia minima* Cooke, on *Albizzia gummifera*; *Skierka congensis* P. Henn., on *Alchornea cordifolia*; *Uredo longænsis* P. Henn., on *Combretum* sp.; *Uromyces melantheræ* Cooke, on *Melanthera brownei*.

Mr. H. Sydow, who kindly identified some of the above fungi, has described the following new species from Sierra Leone: *Aecidium deightonii* Syd., on *Xylopia æthiopica*; *Aecidium marsdeniæ* Syd., on *Marsdenia latifolia*; *Cæoma callianthum* Syd., on *Salacia senegalensis*; *Cerotium proxunellum*, Syd., on *Lamea afzelii*; *Coleosporium phyllanthinum* Syd., on *Phyllanthus discoideus*; *Desmotelium coetaneum* Syd., on *Millettia rhodantha*; *Goplana concinna* Syd., on *Chasalia afzelii*; *Haplophragmium millettiae* Syd., on *Millettia-lanepoolei*; *Hemeleia deightonii* Syd., on *Rauwolfia vomitoria*; *Hemileia scitula* Syd., on *Periplocia nigrescens*; *Olivea scitula* Syd., on *Vitex cuneata*; *Puccinia*

agrophila Syd., on *Andropogon tectorum* and *A. gabonensis*; *Puccinia insperata* Syd., on *Ostryoderris leucobotrya*; *Ravenelia zygiae* Syd., on *Albizzia zygiae*; *Sphaerophragmium evernium* Syd., on *Dialium guineense*; *Uromyces calotheus* Syd., on *Urginea indica*; *Lembosia lophiræ* Syd., on *Lophira alata*; *Lembosia vismiæ* Syd., on *Vismia leonsis*; *Septoria oligostegia* Syd., on *Amphimas pterocarpoides*; *Helminthosporium lophiræ* Syd., on *Lophira alata*.

The following records of entomogenous fungi were kindly identified by Mr. T. Petch: *Aschersonia badia* Pat., on aleurodids on *Ficus capensis*; *Aschersonia placenta* B. & Br., on *Aleuromarginatus tephrosiæ* on *Tephrosia vogelii*; *Empusa fresenii* Nowak, on aphids on *Tephrosia candida*.

About 150 specimens of fungi and sixty specimens of flowering plants were collected during the year and despatched to the Imperial Mycological Institute and Royal Botanic Gardens, Kew, respectively, duplicates being placed in the HERBARIUM.

F. C. DEIGHTON,
Plant Pathologist.

APPENDIX VI.

NJALA OIL-PALM PLOTS.

Cultural operations were the same as in previous years.

THE NIGERIAN PALMS are in their seventeenth year after planting. One palm of the thick-shelled (*B*) group died in December, 1937, leaving the number of trees of this type in the plot now 159.

Eleven trees of the *A* and eleven of the *B* group did not fruit in 1937. Five of these have given average yields in the past, and the remainder are low yielders.

The figures for the YIELD of the different groups, the yield of the whole plantation, and of averages, etc., are given in Tables A—G. The yield for the year was 5,754 kg. of fruit; 182 kg. more than in 1936. As in 1936, the second wave of fruiting was about November. The number of fruit-bearing heads harvested was 853, as against 881 in 1936.

In regard to FLOWERING, the number of female inflorescences at anthesis was 249 less than in 1936. As in 1936, the spring wave of flowering was almost completely suppressed. The number of male inflorescences produced during the year was 633 less than in 1936, but the ratio (1:5·4) of female to male inflorescences at anthesis was even higher than in 1936.

The highest yielding *A* palm in 1937 gave 60 kg. of fruit as against 74 for the highest yielding *B*. As usual, there was a higher proportion of higher yielding palms of *B* type than of *A*, and the average yield of *B* palms was only 1·3 times that of *A*. Most of the palms in the plot gave yields between 5 and 25 kg. of fruit. In regard to total yield of fruit for the twelve years 1926–1937, the highest yielding *A* palm has given 503 kg. and the highest *B* 499 kg.

The figures for the yield of the NATIVE OIL-PALMS are given in Tables H—K. The yields were slightly higher than in 1936. The majority of the palms gave low yields. The highest yielding palms in 1937 gave : Kawei, 41 kg. ; Henoi, 38.5 kg. ; Kpolei, 56 kg.

The figures for the yield of the ANGOLA PALMS are given in Table L. The total yield was 62 kg. more than in 1936, the increase being shown especially by the thin-shelled palms. The six palms gave the following yield of fruit :—

Palms bearing thick-shelled fruit—53.5 and 50 kg.

Palms bearing thin-shelled fruit—57.5, 50.5, 48.5 and 30.5 kg.

The average annual yield of fruit per tree for the six years 1932-1937 has been about 37.5 kg. (or nearly 82½ lb). The best thin-shelled palm has averaged, over the last six years, 45 kg. (or over 99 lb.) of fruit per year.

The figures for the yield of the DELI PALMS are given in Table M. The yield was 481 kg. more than in 1936, all but five of the palms bearing fruit this year. The majority bore between 10 and 30 kg. of fruit in 1937, while four gave over 50 kg., and one palm bore nearly 82 kg. (or nearly 180 lb.). This palm has averaged 31 kg. of fruit per year in the first five years of its bearing.

The average weight of head and of fruit per head for the native, Angola and Deli palms is given in Table N. The figures are similar to those of 1936.

BREEDING WORK was begun in November–December, 1937 when three female inflorescences on the best Angola palm were self-pollinated.

F. C. DEIGHTON,

Plant Pathologist.

TABLE A.

NIGERIAN OIL-PALMS, NJALA, 1937.

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YIELD OF A.					YIELD OF B.				YIELD OF C.				YIELD OF D.			
	Number of trees from which heads were harvested.	Number of heads harvested.	Weight of heads, kg.	Weight of fruit, kg.	Number of trees from which heads were harvested.	Number of heads harvested.	Weight of heads, kg.	Weight of fruit, kg.	Number of trees from which heads were harvested.	Number of heads harvested.	Weight of heads, kg.	Weight of fruit, kg.	Number of trees from which heads were harvested.	Number of heads harvested.	Weight of heads, kg.	Weight of fruit, kg.
January ...	14	15	184.9	115.4	27	31	428.2	284.3	2	2	24.4	15.2	—	—	—	—
February ...	20	27	295.5	183.6	30	40	516.6	339.2	—	—	—	—	—	—	—	—
March ...	44	71	600.5	392.6	65	107	1,200.8	777.6	7	11	66.6	43.3	—	—	—	—
April ...	58	104	844.5	554.9	56	85	818.5	553.7	7	10	104.6	71.5	1	3	28.7	19.2
May ...	44	83	679.2	454.7	37	56	535.0	371.0	3	3	22.7	14.5	—	—	—	—
June ...	6	12	75.0	49.0	10	14	111.6	75.5	2	2	17.9	11.6	—	—	—	—
July ...	5	6	40.9	26.5	6	7	54.8	35.7	—	—	—	—	—	—	—	—
August ...	7	7	71.6	48.3	14	15	133.7	92.5	1	1	4.3	2.9	—	—	—	—
September ...	8	10	89.7	63.2	16	17	176.2	122.3	4	4	36.3	23.7	—	—	—	—
October ...	14	16	157.6	110.3	17	21	292.0	211.0	3	5	46.2	30.3	—	—	—	—
November ...	22	25	317.1	222.2	18	21	329.8	223.0	1	1	11.0	7.0	—	—	—	—
December ...	9	10	113.0	76.1	11	11	193.9	133.2	—	—	—	—	—	—	—	—
Total	138	386	3,469.5	2,296.8	149	425	4,791.1	3,219.0	15	39	334.0	220.0	1	3	28.7	19.2

TABLE B.
NIGERIAN OIL-PALMS, NJALA, 1937.
YIELD OF WHOLE PLANTATION.

		Number of trees from which heads were harvested.	Number of heads harvested.			Weight of good heads harvested, kg.	Weight of fruit, kg.
January	...	43	48	+	1 blind	49	415
February	...	50	67	+	4	=	523
March	...	116	189	+	4	=	1,213
April	...	122	202	+	2	=	1,199
May	...	84	142	+	4	=	840
June	...	18	28	+	20	=	136
July	...	11	13	+	6	=	62
August	...	22	23	+	3	=	144
September	...	28	31	+	12	=	209
October	...	34	42	+	10	=	352
November	...	41	47	+	17	=	452
December	...	20	21	+	13	=	209
Total	...	303	853	+	96 blind	=	5,754
						949	8,623

TABLE C. •
NIGERIAN OIL-PALMS, NJALA, 1937.
ANALYSIS OF INDIVIDUAL TREE YIELD IN THE PLANTATION.

Yield in Kg. of fruit.	Age in years															Total number of trees in the plot bearing in 1937.
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	
Actual plot figures.	A	18	29	24	25	15	9	7	4	2	3	2	—	—	—	
	B	9	23	24	22	20	16	12	12	—	3	3	1	—	1	
	C	1	5	1	3	4	1	—	—	—	—	—	—	—	—	
	D	—	—	—	1	—	—	—	—	—	—	—	—	—	—	
Total (Whole Plot) ...																
Percentage of bearing trees in the plot.	A	28	57	49	51	39	26	19	16	2	6	3	5	1	1	
	B	13.0	21.0	17.4	18.1	10.9	6.5	5.1	2.9	1.4	2.2	—	1.4	—	—	
		6.0	15.4	16.1	14.8	13.4	10.7	8.1	8.1	—	2.0	2.0	2.0	0.7	0.7	
	Whole Plantation	9.2	18.8	16.2	16.8	12.9	8.6	6.3	5.3	0.7	2.0	0.9	1.7	0.3	—	0.3

TABLE D.
NIGERIAN OIL-PALMS, NJALA, 1937.

COMPARISON OF TOTAL YIELD OF FRUIT OF INDIVIDUAL TREES IN THE PLANTATION FOR THE
TWELVE YEARS, 1926-1937.

Yield in Kg. of Fruit.	0-25	25-50	50-75	75-100	100-125	125-150	150-175	175-200	200-225	225-250	250-275	275-300	300-325	325-350	350-375	375-400	400-425	425-450	450-475	475-500	500-525	Total number of trees in the plot bearing.
A	5	5	3	8	10	17	22	22	14	13	14	7	6	—	1	—	1	—	—	—	1	149
B	2	5	1	3	5	10	15	14	18	19	13	15	8	8	10	4	1	4	3	2	—	160
C	—	—	—	1	1	3	1	3	2	2	1	—	1	—	—	—	—	—	—	—	—	15
D	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	1
Total	7	10	4	12	16	30	38	39	34	35	28	22	15	8	11	4	2	4	3	2	1	325

Eight trees have not yet borne fruit.

TABLE E.
NIGERIAN OIL-PALMS, NJALA, 1937.

— —				Average weight, heads, kg.	Average weight, fruit per head, kg.	Percentage fruit in head.
January—	A	...	...	12.3	7.7	62
	B	...	...	13.8	9.2	66
	Whole plot	...	...	13.3	8.6	65
February—	A	...	...	10.9	6.8	62
	B	...	...	12.9	8.5	66
	Whole plot	...	...	12.1	7.8	64
March—	A	...	...	8.5	5.5	65
	B	...	...	11.2	7.3	65
	Whole plot	...	...	9.9	6.4	65
April—	A	...	...	8.1	5.3	66
	B	...	...	9.8	6.5	68
	Whole plot	...	...	8.9	5.9	67
May—	A	...	...	8.2	5.5	67
	B	...	...	9.6	6.6	69
	Whole plot	...	...	8.7	5.9	68
June—	A	...	...	6.4	4.1	65
	B	...	...	8.0	5.4	68
	Whole plot	...	...	7.3	4.9	67
July—	A	...	...	6.8	4.4	65
	B	...	...	7.8	5.1	65
	Whole plot	...	...	7.4	4.8	65
August—	A	...	...	10.2	6.9	67
	B	...	...	8.9	6.2	69
	Whole plot	...	...	9.1	6.3	69
September—	A	...	...	9.0	6.3	70
	B	...	...	10.4	7.2	69
	Whole plot	...	...	9.7	6.7	69
October—	A	...	...	9.9	6.9	70
	B	...	...	13.9	10.0	72
	Whole plot	...	...	11.8	8.4	71
November—	A	...	...	12.7	8.9	70
	B	...	...	15.7	10.6	68
	Whole plot	...	...	14.0	9.6	69
December—	A	...	...	11.3	7.6	67
	B	...	...	17.6	12.1	69
	Whole plot	...	...	14.6	9.9	69
The year	A	...	...	9.0	6.0	66
	B	...	...	11.3	7.6	67
	Whole plot	...	...	10.1	6.7	67

TABLE F.
NIGERIAN OIL-PALMS, NJALA, 1937.

	AVERAGE YIELD OF FRUIT PER TREE.		AVERAGE YIELD OF FRUIT PER ACRE (at 75 trees).	
	A (Number of trees fruiting, 138) kg.	B (Number of trees fruiting, 149) kg.	A kg.	B kg.
January ..	0.8	1.9	63	143
February ..	1.3	2.3	100	171
March ...	2.8	5.2	213	391
April ...	4.0	3.7	301	279
May ...	3.3	2.5	247	187
June ...	0.4	0.5	27	38
July ...	0.2	0.2	14	18
August ...	0.3	0.6	26	47
September ...	0.5	0.8	34	61
October ...	0.8	1.4	60	106
November ...	1.6	1.5	121	112
December ...	0.6	0.9	41	67
Whole year ...	16.6	21.6	1,247	1,620

Average yield over all of fruit per fruiting tree, 19.0 kg. (Number of trees fruiting, 303.)

Average yield over all of fruit per acre (at 75 trees), 1,424 kg.

TABLE G.

NIGERIAN OIL-PALMS, NJALA, 1937.
MALE AND FEMALE INFLORESCENCES AT ANTHESIS IN
DIFFERENT MONTHS.

	Number of male inflorescences at anthesis.	Number of female inflor- escences at anthesis.	Ratio of male to female inflorescences at anthesis.
January	393	50	7·9
February	310	17	18·2
March	263	28	9·4
April	333	31	10·7
May	218	51	4·3
June	201	52	3·9
July	109	38	2·9
August	83	38	2·2
September	127	34	3·7
October	494	131	3·8
November	563	145	3·9
December	589	73	8·0
Total for the year	3,683	688	5·4

TABLE H.
KAWEI OIL-PALMS, NJALA, 1937.
(161 trees, in their 13th year after planting.)

	Number of trees from which heads were harvested.	Number of heads harvested.		Weight of good heads. kg.	Weight of fruit. kg.	Number of male inflorescences at anthesis.	Number of female inflorescences at anthesis.	Ratio of male to female inflorescences at anthesis.
January	40	68	1 blind	368	234	112	53	2.1
February	44	82	+	417	265	96	40	2.4
March	37	67	+	317	199	150	31	4.8
April	29	69	+	286	182	197	42	4.7
May	46	75	+	362	229	177	47	3.8
June	38	67	+	386	251	75	17	4.4
July	35	51	+	243	155	46	12	3.8
August	26	37	+	146	93	71	11	6.4
September	20	24	+	125	81	215	31	6.9
October	27	43	+	243	157	749	123	6.0
November	14	21	+	118	78	304	167	1.8
December	5	7	+	42	27	136	162	0.8
Total	144	611	+	3,053	1,951	2,328	736	3.2

Average yield of fruit per bearing tree, 13.5 kg.

TABLE J.
HENOI OIL-PALMS, NJALA, 1937.
(104 trees, in their 13th year after planting.)

—	Number of trees from which heads were harvested.	Number of heads harvested.			Weight of good heads, kg.	Weight of fruit, kg.	Number of male inflorescences at anthesis.	Number of female inflorescences at anthesis.	Ratio of male to female inflorescences at anthesis.
January	20	35	+	0 blind	174	111	16	18	0.9
February	31	74	+	1 "	295	181	19	22	0.9
March	30	62	+	0 "	173	105	38	24	1.6
April	25	53	+	4 "	135	78	95	23	4.1
May	21	47	+	1 "	166	101	100	48	2.0
June	17	25	+	9 "	98	64	53	26	2.0
July	11	14	+	8 "	42	26	20	19	1.0
August	8	12	+	1 "	41	25	31	17	1.8
September	16	21	+	0 "	80	51	114	34	3.4
October	18	26	+	6 "	151	97	206	154	1.3
November	26	41	+	7 "	207	132	102	190	0.5
December	11	14	+	3 "	62	40	50	103	0.5
Total	87	423 + 40	+	" =	1,624	1,011	844	678	1.2

Average yield of fruit per bearing tree, 10.6 kg.

TABLE K.
KPOLEI OIL-PALMS, NJALA, 1937.
(74 trees, in their 12th year after planting.)

—	Number of trees from which heads were harvested.	Number of heads harvested.			Weight of good heads, kg.	Weight of fruit, kg.	Number of male inflorescences at anthesis.	Number of female inflorescences at anthesis.	Ratio of male to female inflorescences at anthesis.
January	6	7	+	2 blind	57	36	42	3	14.0
February	12	22	+	0	180	115	18	7	2.6
March	28	62	+	1	370	251	7	2	3.5
April	29	78	+	1	510	326	23	4	5.7
May	20	59	+	0	388	248	21	8	2.6
June	8	10	+	0	68	45	19	8	2.4
July	—	—	—	—	—	—	7	54	0.1
August	2	4	+	0	22	14	18	5	5.6
September	1	1	+	0	7	5	75	21	3.6
October	4	4	+	1	42	29	161	51	3.1
November	3	8	+	2	46	30	177	54	3.1
December	3	4	+	1	37	25	114	27	4.2
Total	62	259	+	8 blind	1,727	1,124	682	244	2.8

Average yield of fruit per bearing tree, 18.1 kg.

TABLE L.
ANGOLA OIL-PALMS, NJALA, 1937.
(6 trees, in their 11th year after planting.)

	Number of trees from which heads were harvested.	Number of heads harvested.	Weight of good heads harvested, kg.	Weight of fruit, kg.	Number of male in- florescences at anthesis.	Number of female inflorescences at anthesis.	Ratio of male to female inflorescences at anthesis.
January	2	4 + 0 blind = 4	44	30	6	4	1.5
February	2	2 + 0 " = 2	28	19	5	1	5.0
March	4	8 + 0 " = 8	70	47	8	3	2.7
April	4	12 + 0 " = 12	108	72	2	1	2.0
May	3	8 + 0 " = 8	72	48	1	2	0.5
June	4	8 + 0 " = 8	72	48	7	0	—
July	2	2 + 0 " = 2	12	7	3	0	—
August	1	1 + 0 " = 1	8	5	0	3	0.0
September	2	2 + 1 " = 3	16	10	3	3	1.0
October	1	1 + 0 " = 1	8	5	8	6	1.3
November	—	—	—	—	10	14	0.7
December	—	—	—	—	11	6	1.8
Total	6	48 + 1 blind = 49	438	291	64	43	1.5

Average yield of fruit per bearing tree, 48.4 kg.

TABLE N.
NATIVE, ANGOLA, AND DELI OIL-PALMS, NJALA, 1937.

		Average weight, head, kg.					Average weight, fruit per head, kg.				
		Kawei.	Henoi.	Kpolei.	Angola.	Deli.	Kawei.	Henoi.	Kpolei.	Angola.	Deli.
January ...	...	5.4	5.0	8.1	11.0	9.7	3.4	3.2	5.1	7.5	6.4
February ...	...	5.1	4.0	8.2	14.0	8.7	3.2	2.5	5.2	8.5	5.7
March ...	...	4.7	2.8	6.0	8.7	9.0	3.0	1.7	4.1	5.9	5.8
April ...	...	4.1	2.5	6.5	9.0	8.6	2.6	1.5	4.2	6.0	5.8
May ...	...	4.8	3.5	6.6	9.0	7.4	3.1	2.1	4.2	6.0	4.8
June ...	...	5.7	3.9	6.8	9.0	9.6	3.7	2.6	4.5	6.0	6.6
July ...	...	4.8	3.0	—	6.0	7.6	3.0	1.9	—	3.5	4.9
August ...	...	3.9	3.4	5.5	8.0	7.0	2.5	2.1	3.5	5.0	4.6
September ...	...	5.2	3.8	7.0	8.0	8.5	3.4	2.4	5.0	5.0	5.6
October ...	...	5.6	5.8	10.5	8.0	8.9	3.7	3.7	7.2	5.0	6.0
November ...	...	5.6	5.0	5.7	—	11.3	3.7	3.2	3.7	—	7.7
December ...	...	6.0	4.6	9.2	—	10.9	3.9	2.9	6.2	—	7.3
Whole year	...	5.0	3.8	6.7	9.1	8.9	3.2	2.4	4.3	6.0	5.9

APPENDIX VII.

LIVESTOCK.

The Livestock Officer arrived 28th August.

Cattle.—During September the few cattle round Njala were seen; with the exception of some near Taiama they appeared to be in good health.

In October, with Mr. E. I. Nisbett, Agricultural Officer, a tour was made to Sefadu *via* Bo and Kenema. At the two latter places a few cattle were seen; they were healthy, but there did not appear to be enough grazing for larger numbers, the country being mostly covered with thick bush. At Sefadu the cattle were in good condition and grazing was plentiful.

During December I proceeded to Kabala and district, travelling as far as Falaba. The conditions resembled those at Sefadu but cattle were far more numerous. Nearly all belong to nomadic Fulahs and are moved from place to place according to the grazing. An important factor influencing the number of cattle in a district is the goodwill of the native chief. Should he be popular with the Fulahs his grass-lands are well grazed, if not the cattle are moved from his district.

A Chief, or any other man owning cattle usually hands them over to the care of a Fulah who is then entitled to keep every third calf. Milking is done twice daily. Thick milk is consumed by Fulahs and some natives. Butter or ghee is made for local use or sale. Too many non-descript bulls are allowed in the herds.

Cattle Diseases.—In September cattle belonging to the Taiama Chief were said to have been attacked by "fly." The animals were inspected, but the only flies seen were a few large Tabanids at the time, which the natives said were not the cause of their trouble. Blood smears were taken from a sickly cow, and these showed signs of Trypanosomiasis Vivax. Later, the animal in question died.

During September, the District Commissioner, Bo, reported that cattle had died in the Komboya Chiefdom, as a result of the attacks of certain flies. Inquiries established the fact that these insects were Stomoxys (probably nigra), and that similar cases had occurred in several other places—natives making the report only when the damage was done and the flies gone, so no first hand information was obtained.

The flies were said to appear in large numbers in August and September, disappearing with the end of the rains in October. No other disease or scourge was reported.

Sheep.—During my tours few sheep were to be seen. Those encountered were not in a flourishing condition.

At Njala nine sheep died during the year, apparently of plant poisoning. The remainder are now kept from grazing on uncleared land and are in good health and condition. Lambs are all doing well.

Goats.—These appear to thrive, especially in the Southern Province, in thick bush country.

Pigs.—Few have been seen, and these were half starved and ill-kept.

Poultry.—The demand for Rhode Island Red eggs for sitting, and for breeding fowls from Njala was so great that orders could not be executed. An endeavour is being made to treble the stock. Large numbers of pure and cross-bred chicks have been hatched, and these are strictly culled.

In future only selected birds will be used for breeding, as trap-nests have been in use for the last year.

The usual trouble from worms, gape-worms, ants, hawks etc. was experienced. In eleven months hawks alone accounted for 108 chicks and half-grown birds.

Poultry Extension.—The poultry experiment at Gbenderu village is progressing normally.

In October a fair number of birds showed unmistakable signs of the Rhode Island Red strain and there was an improvement in the size of eggs.

Of the original eight cocks supplied for the experiment only two survived. In November these were sent to Kinse village at Sefadu and three pure-bred birds put in their place.

In November similar experiments as that in Gbenderu were started at Kinse village and the Court Messengers' barracks, Sefadu.

The District Commissioner, Sefadu, reports well of both places.

S. A. ROACH,
Livestock Officer.

APPENDIX VIII.

DISTRIBUTION OF PLANTING MATERIAL, 1937.

	Northern Province.	Southern Province.	Colony.
<i>Anona cherimolia</i> , seed, pkt. ...	—	1	—
<i>Averrhoa carambola</i> ...	—	1	—
Avocado pear, grafted plants ...	—	28	—
„ seedlings ...	9	14	6
Banana, Canary (suckers) ...	145	—	164
Beans, Lima pole, pkt. ...	—	3	—
Breadfruit ...	3	10	—
Breadnut ...	—	4	—
Cabbage, seed, pkt. ...	—	3	—
Calopogonium mucunoides, seed, pkt. lb. ...	—	24	—
Cape Gooseberry ...	—	24	—
Capsicum, seed, pkt. ...	—	2	—
Cashew seedlings ...	6	9	—
Cassava, Mayugbe, sticks (bundles)	56	103	—
„ Two cent, „ ...	22	50	—
Chili, Tuticorin, seed, pkt. ...	—	6	—
Cinnamon, seedlings ...	—	9	—
Coco yam, crowns, lb. ...	22	—	—
Coconuts, seedlings ...	8	—	—
Coffee Robusta, seed, lb. ...	75	190	—
„ „ seedlings ...	1,810	1,422	178
„ Stenophylla, seed, lb. ...	—	90	—
„ „ seedlings ...	—	—	110
Collard, seed, pkt. ...	—	1	—
Cucumber „ ...	—	2	—
Egg plant „ ...	—	5	—
Ginger, seed, lb. ...	840	1,175	—
Governor Plum ...	—	27	—
Grapefruit, budded plants ...	—	102	47
Groundnut, Kono, seed, lb. ...	118	105	—
Guava, seedlings ...	—	68	—
Jakfruit, seed ...	—	40	—
Jakfruit, seedlings ...	—	23	—
Kola ...	—	26	—
Lemon, budded plants ...	—	29	—
Lettuce, seed, pkt. ...	—	6	—
Mango, grafted plants ...	—	25	—
Oil-palm, Angola, seed, lb. ...	—	9	—
„ „ seedlings ...	142	—	—
„ Deli, seed, lb. ...	—	226	—
„ „ seedlings ...	773	217	—
„ Kawei, seed, lb. ...	—	175	—
„ Nigerian, „ ...	—	182	—
Okra, seed, pkt. ...	—	5	—
Orange, Lue Gim Gong, budded plants	—	41	—
Orange, seedlings ...	291	—	—
Pawpaw, seed, pkt. ...	—	8	—

APPENDIX VIII—*contd.*DISTRIBUTION OF PLANTING MATERIAL, 1937—*contd.*

		Northern Province.	Southern Province.	Colony.
Pepper, black, cuttings ...	...	—	15	—
„ seed, pkt. ...	...	—	7	—
Pigeon pea, seed, pkt. ...	...	—	3	—
Pine-apple, Queen ...	...	—	—	80
„ Red Spanish ...	...	—	—	78
„ Smooth Cayenne ...	...	96	—	—
Pitanga cherry, cuttings ...	...	—	30	—
„ seedlings ...	...	—	36	—
<i>Phaseolus lunatus</i> , seed, lb. ...	...	—	16	—
Radish, seed, pkt. ...	...	—	1	—
Rice, G.E.B. 24, bushels ...	...	1,644	80	107½
„ Co. 7 „ ...	...	52	—	—
„ Kavunginpoothala, bushels ...	...	33	15	14½
„ Litoma „ ...	...	—	—	26½
„ D.C. Swamp „ ...	...	33	—	26
„ „ Upland ...	...	90	—	54
„ Fodea ...	...	—	—	56
„ Miscellaneous, wet-land, bus: ...	...	69	—	—
Roseapple ...	...	—	9	—
Sapodilla ...	...	—	1	—
Snake gourd, seed, pkt. ...	...	—	5	—
Soursop ...	...	—	11	—
Sweet lime ...	...	—	28	—
Sweet sop ...	...	—	6	—
Tangerine, seedlings ...	...	63	—	—
Tomato, seed, pkt. ...	...	—	13	—
Yams, Chinese, seed, lb. ...	...	646	15	—
„ Jaffna King, lb. ...	...	1,392	227	—
„ Nigerian No. 105 seed, lb. ...	...	—	2	—
„ „ 152 „ ...	...	—	32	—
„ Yellow, seed, lb. ...	...	3,134	—	—
„ Port Loko White seed, lb. ...	...	—	43	—
Miscellaneous Fruit trees (seedlings) ...	...	51	—	—
„ Vegetables, pkts. ...	...	44	—	—

APPENDIX VIIIA.

DISTRIBUTION OF PLANTING MATERIAL, 1937.

ORNAMENTAL PLANTS FROM NJALA AGRICULTURAL STATION.

Acalypha, cuttings	...	...	...	...	113
<i>Agave americana</i> ...	...	...	...	...	3
Allamanda, cuttings	...	...	...	...	60
Angelica, „	...	...	...	...	920
<i>Aristolochia splendens</i> , seed, pkt.	...	...	...	...	2
Balsam, seed, pkt....	...	...	...	...	1
<i>Bambusa arundinacea</i> , cuttings	...	...	...	...	50
<i>Bauhinia acuminata</i> , seed, pkt.	...	...	...	...	1
„ <i>alba</i> „	...	...	...	...	2
„ <i>monandra</i> „	...	...	...	...	2
„ <i>tomentosa</i> „	...	...	...	...	2
Begonia ...	...	...	...	...	3
<i>Bignonia unguis-cati</i> ...	...	...	...	...	25
Bougainvillea (purple), cuttings	...	...	...	...	220
„ (red) „	...	...	...	...	25
„ „ cuttings	...	...	...	...	40
<i>Brunfelsia americana</i> , seed, pkt.	...	...	...	...	6
<i>Caladium bicolor</i> ...	...	...	...	...	60
Canna, tubers	...	...	...	...	500
<i>Cassia siamea</i> , seed, pkt.	...	...	...	...	4
„ <i>sieberiana</i> , seed, pkt.	...	...	...	...	3
<i>Clerodendron fallax</i> ...	...	...	...	...	4
„ <i>paniculatum</i> ...	...	...	...	...	134
<i>Convolvulus major</i> , seed, pkt.	...	...	...	...	2
Copsia, seedlings	...	...	...	...	4
Croton, cuttings	...	...	...	...	700
<i>Curculigo</i> , sp.	...	...	...	...	3
<i>Dillenia indica</i> , seed, pkt.	...	...	...	...	1
<i>Derris microphylla</i> , „ „	...	...	...	...	2
Dracæna, cuttings	...	...	...	...	40
<i>Erythrina glauca</i> , cuttings	...	...	...	...	11
Fan palm	...	...	...	...	9
Flamboyante, seed, pkt.	...	...	...	...	3
<i>Gardenia</i> sp., „	...	...	...	...	1
<i>Gliricidia maculata</i> , cuttings	...	...	...	...	153
<i>Gmelina hystrix</i> , „	...	...	...	...	16
Hibiscus, cuttings	...	...	...	...	22
Hydrangea	...	...	...	...	64
Ice plant	...	...	...	...	6
<i>Ipomæa dissecta</i> , seed, pkt.	...	...	...	...	2
<i>Ixora coccinea</i> ...	...	...	...	...	33
„ <i>lutea</i> ...	...	...	...	...	66
Jacquemontia, seed, pkt.	...	...	...	...	1
„ seedlings	...	...	...	...	11
<i>Jasminum grandiflorum</i> ...	...	...	...	...	40
„ <i>pubescens</i> ...	...	...	...	...	6
<i>Jatropha multifida</i> ...	...	...	...	...	3
<i>Kleinhovia hospita</i> , seed, pkt.	...	...	...	...	1
<i>Lagerstræmia flos-reginæ</i> ...	...	...	...	...	14
„ <i>indica</i> ...	...	...	...	...	6

APPENDIX VIIIA.—*contd.*DISTRIBUTION OF PLANTING MATERIAL, 1937—*contd.*ORNAMENTAL PLANTS FROM NJALA AGRICULTURAL STATION—*contd.*

<i>Leucæna glauca</i>	27
<i>Luffa ægyptica</i> , seed, pkt.	1
„ spp. (1 & 2), seed, pkt.	2
<i>Lysidice rhodostegia</i>	6
Moon flower, seed, pkt.	4
Morning Glory	45
Oleander, cuttings	56
Persian lilac	3
<i>Petrea volubilis</i>	13
Plumbago	11
Poinsettia, cuttings	163
<i>Solanum wendlandii</i>	8
Pride of Barbados, seed, pkt.	4
Pride of Barbados, seedlings	3
Quisqualis, cuttings	58
<i>Rubus lasiocarpus</i> , seed, pkt.	1
Saman, seed, pkt.	3
Screw pine	3
<i>Solanum macranthum</i>	4
„ <i>seaforthianum</i>	6
<i>Tecoma stans</i> , seed, pkt.	2
<i>Thespesia lampas</i> , seed, pkt.	1
<i>Thrinax argentea</i>	1
<i>Thunbergia erecta</i> , cuttings	63
„ <i>laurifolia</i>	9
Zinnia, seed, pkt.	3

ORNAMENTAL PLANTS FROM ROKUPR EXPERIMENTAL STATION.

Ornamental—Miscellaneous seedlings	32
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PLANTS AND SEEDS INTRODUCTIONS—1937.

			ORIGIN.
<i>Allamanda schottii</i> ...	...	...	Gold Coast
<i>Cæsalpinia sappan</i> ...	...	...	"
<i>Calliandra caracasera</i> ...	...	...	"
<i>Centrosema pubescens</i> ...	...	...	"
<i>Coleus</i> (Hausa Potato) ...	...	...	"
Early Millet ...	...	...	"
<i>Galphimia brasiliensis</i> ...	...	...	"
<i>Gynandropsis pentaphylla</i> ...	...	...	"
Late Millet ...	...	...	"
<i>Sophora tomentosa</i> ...	...	...	"
<i>Thespesia populnea</i> ...	...	...	"
<i>Cocothrinax argenta</i> ...	...	...	Florida (U.S.A.)
" " var <i>garberii</i> ...	...	...	"
" <i>jucunda</i> ...	...	...	"
<i>Thrinax microcarpa</i> ...	...	...	"
" <i>wendlandiana</i> ...	...	...	"
<i>Chorchorus capsularis</i> ...	...	...	Bengal
" <i>olitorius</i> ...	...	...	"
<i>Cordia sebestena</i> ...	...	...	Washington (U.S.A.)
<i>Flacourtia ramontchi</i> ...	...	...	"
" <i>rukam</i> ...	...	...	"
Chili, Hontaka ...	...	...	Japan
" Portuguese W. Africa ...	...	...	Portuguese W. Africa
" Tuticorin ...	...	...	Ceylon
<i>Acacia dealbata</i> ...	...	...	United Kingdom
" <i>lophantha</i> ...	...	...	"
<i>Asparagus plumosus nanus</i> ...	...	...	"
<i>Begonia lloydii</i> ...	...	...	"
<i>Coleus</i> (Suttons) ...	...	...	"
" <i>thyrsoideus</i> ...	...	...	"
<i>Fuchsia</i> ...	...	...	"
Various edible legumes ...	...	...	British Guiana
<i>Gerbera</i> ...	...	...	United Kingdom
<i>Salvia</i> (Suttons) ...	...	...	"
<i>Verbena</i> ...	...	...	"
Sweet Potato (red) ...	...	...	French Guinea
" (yellow) ...	...	...	"
<i>Sesamum orientale</i> Linn " rains " type ...	...	...	Mandalay, Burma
" " " " winter " type ...	...	...	"
<i>Anona cherimolia</i> ...	...	...	Georgia (U.S.A.)
<i>Areca lutescens</i> ...	...	...	"
<i>Beaumontia grandiflora</i> ...	...	...	"
<i>Bignonia grandiflora</i> ...	...	...	"
<i>Cananga oderata</i> ...	...	...	"
<i>Carissa grandiflora</i> ...	...	...	"
<i>Citrus trifoliata</i> ...	...	...	"
<i>Cupressus macrocarpa</i> ...	...	...	"
<i>Cyphomandra betacea</i> ...	...	...	"
<i>Diospyros kaki</i> ...	...	...	"
<i>Erythea armata</i> ...	...	...	"
" <i>edulis</i> ...	...	...	"

APPENDIX IX—*contd.*PLANTS AND SEEDS INTRODUCTIONS, 1937—*contd.*

				ORIGIN
<i>Erythrina crista-galli</i>	...	...	...	Georgia (U.S.A.)
<i>Feijoa sellowiana</i>	...	...	...	"
<i>Gardenia florida</i>	...	...	...	"
<i>Hedychium gardnerianum</i>	...	...	...	"
<i>Holmskoildea sanguinea</i>	...	...	...	"
<i>Hymenosporum flavum</i>	...	...	...	"
<i>Luculia gratissima</i>	...	...	...	"
<i>Mandevillea suaveoleus</i>	...	...	...	"
<i>Schinus molle</i>	...	...	...	"
<i>Seaforthia elegens</i>	...	...	...	"
<i>Stephanotis floribunda</i>	...	...	...	"
<i>Strelitzia augusta</i>	...	...	...	"
„ <i>nicolai</i>	...	...	...	"
„ <i>reginæ</i>	...	...	...	"
<i>Washingtonia filifera</i>	...	...	...	"
„ <i>robusta</i>	...	...	...	"
„ <i>sonoræ</i>	...	...	...	"
<i>Yucca filamentosa</i>	...	...	...	"
<i>Zingiber officinale</i>	...	...	...	"

APPENDIX X.

RAINFALL, 1937.

	NORTHERN PROVINCE.								SOUTHERN PROVINCE.							COLONY.							
	Batkanu.	Farang-bayal.	Kabala.	Mabouto.	Makeni.	Marampa.	Port Loko.	Rokupr.	Saka-sakala.	Bo.	Bonthe.	Jalama.	Kailahun.	Koyelima.	Moyumba.	Njala.	Segbwema.	Yengema.	Free town.	Hill Station.	Kissy.	Newton.	
January ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
February ...	—	—	—	—	0.03	—	Trace	—	Trace	—	—	1.38	1.48	0.10	—	—	0.19	3.98	0.46	0.01	0.02	—	0.25
March ...	1.60	2.03	4.41	4.29	3.96	1.97	4.03	0.96	3.22	—	—	8.84	10.59	6.83	3.39	2.535	4.95	9.84	6.01	5.29	5.14	2.89	
April ...	4.18	—	6.23	3.52	2.07	1.17	1.43	0.97	—	—	—	6.62	1.53	3.11	3.49	2.04	5.84	6.95	2.18	1.40	3.83	5.95	
May ...	4.20	8.12	8.58	10.61	9.23	4.89	7.34	5.98	8.93	—	5.50	8.52	9.44	8.29	11.59	11.355	8.43	8.515	8.09	10.34	7.64	5.87	
June ...	16.94	11.20	15.85	11.71	13.21	—	16.82	15.00	—	—	4.20	11.27	12.6	10.25	7.38	14.20	13.75	8.66	10.66	11.72	9.66	11.66	
July ...	20.28	25.68	6.28	23.83	16.03	—	20.83	20.82	—	—	12.27	13.52	9.67	16.92	20.78	13.270	8.66	15.37	44.38	62.97	33.43	26.50	
August ...	20.53	40.40	17.43	36.46	32.03	21.57	20.78	29.49	—	22.25	13.78	18.72	12.08	25.65	18.02	22.39	17.99	18.74	39.77	40.23	37.36	36.17	
September...	23.48	22.16	15.36	27.06	22.97	23.47	17.74	20.90	—	22.29	24.33	17.74	13.74	15.28	22.14	19.725	20.68	17.58	25.08	24.03	22.95	18.57	
October ...	21.48	9.79	18.54	20.55	19.35	19.35	15.76	11.64	—	10.06	—	—	10.76	13.68	10.38	11.165	11.94	14.91	7.60	7.29	8.86	8.24	
November...	9.13	7.47	1.28	6.72	6.42	6.99	—	4.37	—	7.85	—	5.33	4.86	5.67	6.76	8.405	7.97	4.70	2.95	4.74	5.48	3.55	
December ...	0.15	1.10	0.40	0.73	0.30	0.35	—	0.07	—	0.96	—	—	1.38	1.01	—	1.06	4.00	1.46	2.14	1.26	0.48	1.22	
Total ...	121.97	—	94.36	145.98	125.60	*	*	110.20	*	*	*	*	87.69	106.79	*	106.335	109.19	107.185	148.87	175.29	134.83	120.87	

*Note.—Where records are incomplete the columns are not added up.

G P.D. O 1012-260 8-6-38.

